GAS JOURNAL

LIGHT • HEAT • POWER • BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

VOL. CLXIII. No. 3139.] LONDON, JULY 11, 1923. [75TH YEAR. PRICE 1s.

OXIDE OF IRON
SPENT OXIDE

GAS PURIFICATION AND CHEMICAL CO., Ltd.
PALMERSTON HOUSE, LONDON, E.C.2.
Telegrams: "PURIFICATION, LONDON."
Telephone: 9144 LONDON WALL.

PUMPING ENGINES
All Types for ACID, &c.
CAST-IRON OR STEEL TANKS
Any Capacity.
CHEMICAL PLANT.
Roofs and Girders. Structural Work.
SULPHATE OF AMMONIA PLANT
Air and Gas Compressors.
MIXERS.
TAR STILLS AND CONDENSERS.
W. NEILL & SON, LD.
Engineers, Iron & Brass Founders,
ST. HELENS JUNCTION.
Telegrams: 'NEILL, ST. HELENS.' Telephone No. 20.

"Ask Berk"
SULPHURIC ACID
(Made from Spent Oxide)
FOR
SULPHATE MAKING
F. W. BERK & CO., LTD.,
1, Fenchurch Avenue, E.C.3
Abbey Mills Chemical Works, Stratford.
Pentrepoth Chemical Works, Morriston.

"TORBAY PAINT"
FOR ALL PURPOSES.
The TORBAY PAINT CO.,
26/28, Billiter St., LONDON, E.C.
51, Old Hall St., LIVERPOOL.

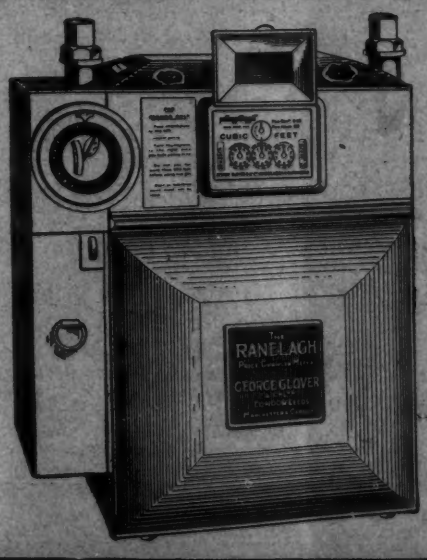
"BLUEBELL"
SILICA RETORTS
(95% SILICA)
John G. Stein & Co., Ltd.,
Castlecary, SCOTLAND.

Telephones: 2906 VICTORIA. 3967 Do.
Telegrams: "GASIFICATION, Sowest, LONDON."
WALTER MOORE & SONS,
GAS COAL & COKE CONTRACTORS,
72, VICTORIA STREET,
LONDON, S.W. 1.

W. & B. COWAN
(Incorporated in Parkinson and W. & B. Cowan, Ltd.),
LONDON. MANCHESTER. EDINBURGH. GLASGOW.
SYDNEY. MELBOURNE. BRISBANE. WELLINGTON, N.Z.
(See Advertisement on p. III. of Wrapper.)

JAMES McKELVIE & CO.
Coal Owners,
Gas and Steam Coal Contractors,
17, RUTLAND SQUARE, EDINBURGH.
89, MARK LANE, LONDON, E.C.
GUILDHALL CHAMBERS, SANDHILL,
NEWCASTLE-ON-TYNE.
24, CHAPEL STREET, LIVERPOOL.
ESTABLISHED 1840.

STEWARTS AND LLOYDS, LIMITED, 41, OSWALD STREET, GLASGOW. BROAD STREET CHAMBERS, BIRMINGHAM.
TUBES & FITTINGS for Gas, Steam, Water, &c.



George Glover's New
"Ranelagh"
Price-changer Pre-payment Gas Meter
The automatic valve of this meter **opens fully for the first coin,** even when set at as small a quantity as 5 feet per penny.
GEORGE GLOVER & CO., LTD.
Ranelagh Works, Royal Avenue, Chelsea, London, S.W.3.
Branches: 74, Diamond Street, Cardiff;
Ranelagh Meter Works, East Park View, Leeds;
City Meter Works, Port Street, Manchester.

BUILDERS *for* INDUSTRY

Many giant structures of Steel have been produced by the Horseley Company to house industrial plant of various kinds. Our resources for the production and erection of Steel Roofs, Buildings, Bridges, Cranes, and constructional work of every description are unrivalled. We are able to quote lowest prices consistent with sound workmanship, and to give and comply with definite delivery dates. Our experience, dating back over a century and a half, is placed freely at the disposal of our customers.

Ask us to quote for constructional work of EVERY DESCRIPTION

HORSELEY BRIDGE & ENGINEERING Co Ltd TIPTON, STAFFS.

FIG. 538.

TAR, LIQUOR, & WATER PUMPS

MADE IN TEN SIZES.

Can be arranged for Working by Power or Hand.

BEST WORKMANSHIP.
PROMPT DELIVERY.

Particulars sent on Application.

Makers of all types of VALVES for Gas, Water, Liquor, and Chemicals, including Double-Faced Valves and Quick-Opening Valves.

GAS EXHAUSTING PLANTS OF ALL SIZES.

THE BRYAN DONKIN CO., LTD., CHESTERFIELD.

London Office: 3, VICTORIA STREET, WESTMINSTER, S.W. 1.

Chesterfield Telephone No. 54.
London Telephone No. 5255 Victoria.

Chesterfield Telegrams, "Donkin Chesterfield."
London Telegrams, "Donkin Company, Sowest, London."

GAS JOURNAL

LIGHT ⁘ HEAT ⁘ POWER ⁘ BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

PROPRIETORS: WALTER KING, LIMITED. OFFICE: 11, BOLT COURT, FLEET ST., LONDON, E.C. 4.

Telephone: Holborn 6857. —— Telegrams: "GASKING, FLEET, LONDON."

VOL. CLXIII., No. 3139.] WEDNESDAY, JULY 11, 1923. [75TH YEAR.

EDITORIAL NOTES.

The New Notification—Position of Continuously Recording Calorimeters.

ALTHOUGH the Notification of the now defunct Metropolitan Gas Referees was designed for application to the three Metropolitan Gas Companies, many gas undertakings, gas examiners, and others carried on their testings in accordance with its provisions so far as they were applicable. Now a new Notification has been issued by the Referees who have been appointed under the Gas Regulation Act, and whose jurisdiction in the matter of gas testing extends to the areas of all gas undertakings which have, or will, come under the provisions of the Act. This being so, as Orders are obtained in conformity with the Act, and as special prescriptions are issued by the Referees for each undertaking, they will have to discard the old Notification, and comply with the new one, or any supplement that is made to it. In other words, this means ignoring completely the prescriptions as to conditions and methods that formerly reigned, and starting *de novo* under the new Notification; for, be it said at once, the old and the new, though they have kinship, have very few features in common. The new Notification will now have to be taken as the *vade mecum* in the matter of the testing provision and work of gas undertaking, gas examiner, local authority, and everybody concerned; and so the sooner a close acquaintance is made with its provisions, the better. The general Notification, it should be remarked, does not over-ride any special prescription issued by the Referees. But it will be brought into force by, and be additional to, any such special prescription, and will apply save as varied by the latter. This must be so, as the circumstances of gas undertakings vary; and it is therefore necessary that the Referees should have latitude in making prescriptions that will not be inconsistent with the prevailing local conditions. For example, there must be a special prescription of testing place or places for each undertaking; and in some extensive gas supply areas, there are several local authorities who will possess testing powers. But, generally speaking, the Notification is constituted of principles, conditions, and methods that will have general application to the extent that the Referees, in their discretion, deem suitable; and the only variation that will be permitted will be set forth in the special prescription. This will greatly simplify matters. Gas undertakings, local authorities, and gas examiners will all receive copies of the special prescription applicable to them; and these will be signed and dated by the Referees. No others will be valid.

Naturally, the new Notification is a more imposing document than the old one, as issued by the Gas Referees when their official jurisdiction was limited to the Metropolitan area, and before the advent of operations under the Gas Regulation Act. This Act has created the need for an extension of conditions. Through it, practically everything connected with the control of the value and quality of gas has undergone change; and, in our opinion, all for the better, as certified compliance with the more exacting obligations that have been enacted will do much to establish a confidence among the consumers that they are getting what they pay for, and what they are statutorily entitled to, such as never previously existed—at any rate, to a degree that could be called satisfactory. And the confidence will become still more stable when a continuously recording calorimeter is prescribed for undertakings making 100 million c.ft. of gas and upwards a year. There is not a great deal in the new Notification referring to recording calorimeters; the reason for this is no doubt to be found in the letter from Prof. Boys which was read at the recent meeting of the Institution of Gas Engineers. In it, he remarked: "Just when, quite "recently, I had decided that the time had arrived when I was "prepared to allow it to be put to severe test, a development "of my calorimeter was brought to my notice which I felt "to be of such profound importance that I consider it is "essential that this should be incorporated together with "the small variations which are the consequence. This "means a further small delay; but where, as I have reason "to believe, increased perfection is obtained, at the same "time as reduced cost, the admittedly great inconvenience "of delay is less than that due to change of pattern at a later "date; and it is better to postpone official trials for the "short time required." This indicates that some period will elapse before there will be any definite prescription of recording calorimeters, as the official trials, when the modified calorimeters are ready for the purpose, will take some time, as constancy over a period is an important factor. There is confirmation of this in the new Notification. The Referees say the special prescription will include, "as soon as it is practicable," a calorimeter for the production of a continuous record of the calorific value of the gas supplied. They are not, however, "prepared at present to specify a "recording calorimeter which they will prescribe for general "use in official testings." But they have "arranged for "trials in official testing-places of recording calorimeters of "several types; and such trials will serve to guide them in "prescribing recording calorimeters for use in official gas "testings." Meantime, non-recording calorimeters are to be used in all undertakings for which special prescriptions are made. These are to be of the Boys type, though other types of water-flow calorimeters, when already provided by the gas undertakers, may be sanctioned by the Referees for use in official testings. While the methods of making tests with the recording instrument will be made in a future Notification, the Referees may in special instances make exceptions, as in the case of the Brentford Gas Company, who are at present using Fairweather calorimeters.

The statement by Prof. Boys is an adequate explanation of, and will be accepted generally as a good reason for, delay; but it means that the continuously recording calorimeter will have to be the subject of special prescription and supplementary notification. There is not much in the present Notification that applies to continuously recording calorimeters; but there is sufficient reference to show that the Referees are going to exercise great care as to their suitable housing and protection from adverse conditions and interference. It is to be hoped that, in prescribing testing-stations, the Referees will at the outset, and as far as possible, only sanction places that will afford suitable habitation for a recording instrument; for it is obvious from the Notification that a place in which the Referees would permit an ordinary calorimeter to be employed, might not be, in their opinion, fit for a recording instrument. It would, therefore, be a pity for a testing station to be fitted up now in accordance with the present Notification, and then later for another to have to be prescribed and refitted owing to the unsuitability of the former for the recording instrument. The Notification says that a testing place provided with a non-recording calorimeter must be well ventilated and not draughty, and must not be subject to great extremes

of temperature. The room temperature should, where possible, be maintained between 50° and 65° Fahr. A room that would answer these requirements might not comply with the prescribed needs of the Referees in respect of continuously recording calorimeters. They say that for such instruments, the testing place "shall not" be subject to draughts, or to violent changes of temperature such as may occur in rooms exposed to the midday sun, or with thin walls, or unprotected overhead by another storey. Generally speaking, the Referees will only approve of a testing-room in which a recording calorimeter is to be placed if it is suitably located, either in a dry and well-ventilated basement or on the ground floor of a substantial building with a north aspect, or, if another aspect, sheltered from the sun's rays by trees or otherwise.

There is also the question of protecting recording instruments from outside interference. To both these and the pressure registers, only the gas examiner is to have access. They will have to be partitioned off; but it is prescribed that they shall be so located that they can be inspected through a window at any time by the representatives of the gas undertakings. The Referees recognize that this provision may enable inspection to be made by other persons, who might utilize the information obtained in a wrongful manner. The useful suggestion is therefore made that a notice may be exhibited, stating that—"The records of "these instruments are subject to verification by the Gas "Examiner, and to appeal by the gas undertakers, and "must not in the meantime be taken as conclusive evid-"ence of the calorific value or pressure of the gas supplied." This, of course, will not apply to non-recording calorimeters used for official testings.

So much for the provisions affecting testings under the Act for calorific power. The Notification is a comprehensive document, as will be seen by the indication of its contents in later columns. With minute care it deals with everything from the service-pipe, the apparatus, the mode of installation, onwards to the methods that are to be complied with in all the operations and testings, together with the questions of reports and appeals. It is clear that nothing is to be done in any perfunctory manner. There is to be exactitude; and this is in the interests of both suppliers and consumers. We see that the service-pipe prescribed for the testing place is not to be less than ¾ in. internal diameter. On this service-pipe there is to be an arm for the testing of pressure. Between the controlling main tap and the testing apparatus, the gas is to pass through a service governor, which is to be so loaded that the water-gauge pressure of the gas passing to the calorimeter and the purity testing apparatus does not exceed 2 in. The Gas Regulation Act provides that "the minimum permissible pressure "shall be such pressure in any main, or in any pipe laid "between the main and the meter having an internal dia-"meter of 2 in. and upwards, as to balance a column of "water not less than 2 in. in height," &c. Supposing to a testing place a ¾-in. service-pipe is laid with a branch for pressure testings, the experts on the flow of gas might tell us whether this would, for pressure-testing purposes, comply with the Act, as to the minimum pressure being 2 in. in any service-pipe having an internal diameter of 2 in. and upwards. In the Notification, provision is made, if desired by a gas undertaking, for a second or independent service-pipe for pressure testings; and, in fact, a second one is imperative for this purpose where a recording calorimeter is to be used.

However, we will not go farther into the details of the Notification. Its length precludes us doing so; and all gas undertakings, we feel sure, will wish to become possessed of a copy of the document in its complete form. This is another of the several important changes which the Gas Regulation Act has brought into the industry.

Fiction and Facts.

According to the fiction of some electrical writers, the decline of the gas industry has set in; and domestic electrification is in the ascendant. Judging from the circulars of the coal merchants, gas is the only competitor that merits attack in defence of their business in supplying an agent that creates domestic labour, and helps to pollute the atmosphere. The gas industry has very good and substantial reason for smiling at the imaginary state of things as pictured by the electrical artists. Every gas undertaking knows what it has done in relieving the worries of those householders who have been tempted to adopt electrical operation for general heating, cooking, and water heating. Every gas undertaking is aware how much has been done in installing labour-saving, ever-ready, and promptly acting gas in place of coal. Though there is still much to be accomplished in this way, most householders to-day are smaller coal consumers than they would have been, had gas not been available. We have previously shown by statistics how false are the electrical assumptions as to decline. The rate of increase of the gas industry is growing, and not diminishing. This has been seen by the accounts and working statements of gas companies in competition with both municipal and company trading in electricity; and the same thing is observed where municipal gas and electricity departments are in competition. We publish to-day the accounts of the Manchester and the Birmingham Corporation Gas Departments. In both cases the net cost of gas production has descended so considerably as to allow material reductions to be made in the charges for gas, and yet leave net surpluses which make the municipal heart rejoice. This trend of affairs is good. The lower the price of gas, the greater the inducement to adopt it for heating purposes of all kinds. Despite industrial depression, Manchester in the last financial year sold no less than 6,169,724,000 c.ft., which was an increase on the previous year of 3·49 p.ct. This percentage is not a lean representative when one is dealing with nearly 6170 million c.ft. The increase at Birmingham was from 10,264,218,300 c.ft. to 10,937,923,300 c.ft.—or 673,705,000 c.ft. In the city gas supply area, no less than 2795 new services were laid during the year; 2235 cooking and heating stoves were sold; the number of cooking and heating stoves on hire increased by 2301; the total number of cookers supplied with meters was raised by 1091; and the prepayment connections advanced by 1374. All these figures show improvements on those for 1922. The gas industry is still extending its base, and is piling up more business. Everything indicates that, with a return to normal conditions, the rate of accretion will be larger still. Some of the electrical observers of the gas industry suffer from impaired vision; the coal merchants prefer to turn their backs on solid facts and a growing public preference. Their actions, however, show that they know that the facts and the preference are there.

The Smoke Abatement Tangle.

The smoke abatement question appears to be getting into a bit of a tangle. All are agreed that we want a cleaner atmosphere, and that this can only be obtained by minimizing the visible exhalations of domestic chimneys and industrial chimney shafts. Though so agreed, various interests are pulling in directions against each other, now that new legislation to deal with the subject is under consideration. But in much that is written and said, there appears to be a substantial lack of candour, and a refusal to recognize that in this matter there is knowledge available which should materially assist in atmospheric improvement. We sympathize with the Federation of British Industries in their endeavour to defend industry against onerous legislation, and therefore obligations; but that can be carried too far—so far, in fact, as to defend uneconomy and inefficiency. We know that in some industries the use of coal is essential, and so is smoke production—for example, in the steel industries of Sheffield, and for some purposes in the pottery industry. But this does not apply to all industries; and there is not the slightest reason why boiler chimneys should emit smoke to the extent that they often do. It shows in the first place indifferent operation, and in the second place the non-application of methods—such as the partial use of coke—which do so much to ameliorate chimney emissions. In the "Fuel Economy Review," issued by the Federation, one reads in an editorial article that the organization is the object of "abuse" for the attitude taken in the defence of manufacturers; and it is declared that many of the critics do not understand the technical aspects of the matter. We are left in a little doubt as to whether the writer of the article fully understands them. If he did, it seems to us that he would suggest that the Federation should steer a middle course in this regard, and advocate that, where smoke prevention in industry is possible, there should be ways and means of making it effective, but where economy in cost and quality of product necessitate a certain amount of smoke, then there should be no legislation which would affect both these desiderata. It should be recognized by the Federation that there are, in this matter, as in others,

manufacturers who are indifferent, and that though smoke creation is unavoidable in some industrial operations, in the majority of them it is avoidable. There are articles in the same number of the "Fuel Economy Review" which show this; and yet the editorial writer, with considerable self-satisfaction, says: "Enough has been said to show the "danger of the smoke abatement propaganda; it avoids the "facts which are unpleasant." The writer of those words should dwell upon them; for, with very little alteration, they could be made to fit his own position.

There can be perfect agreement with Viscount Long and others that the question of smoke abatement legislation should not be treated as a political one. Air sanitation, public health, and cleanliness are matters of national importance, and should in the first place be dealt with by impartial technical counsellors unaffected by party or other considerations; and when it comes to actual legislation, this should also be dealt with irrespective of political divisions. In one of the articles in the Federation "Review," Mr. E. D. Simon carries this idea farther by suggesting that, so far as industry is concerned, the problem can only be approached along two lines: The first is to supply skilled assistance and advice to manufacturers in dealing with the economical and smokeless burning of fuel; and the second is prosecution. He prefers the former; and so do we. Supposing, however, manufacturers will not accept the advice, what is then to happen? Of course, there must be some measure of compulsion. A good example of what is needed is provided by the valuable procedure under the Alkali Works Regulation Act. Mr. Simon admits the difficulty of dealing with slack, indifferent manufacturers; for later on he says it will be necessary to have an Act under which reasonable standards are provided to enable magistrates to judge whether or not a fine is justified. But to please the Federation, manufacturers, and all men, great care would have to be taken in the selection of the technical men to advise Parliament in this matter, and of those to counsel the manufacturers as to what they should do. The writer in the "Review" pillories some of the men who have dared to criticize the action of the Federation. He alludes to a letter by Principal Graham which appeared in the "Manchester Guardian," and then to one by Prof. Cohen, of Leeds University, which was published in "The Times." Now if anyone is technically qualified to speak about the smoke abatement problem, it is Prof. Cohen. Yet we take it that now he would not be acceptable to the Federation as one of the advisers of Parliament, nor to the manufacturers as a technical supervisor in this particular matter. The writer of the article, too, does not regard Lord Newton as an authority, nor his Committee as "technically qualified, *as a whole*, to treat of this aspect of the subject"—that is, the technical aspect.

There are two other articles in the "Review" which attract attention in considering the technical side of the question of smoke abatement, and the hopeless tangle into which it is getting, through an apparent impotence to regard it from all sides. One of the two articles is by Prof. J. O. Arnold, Emeritus Professor of Metallurgy in the University of Sheffield, and the other by Mr. E. W. L. Nicol. Prof. Arnold acknowledges the great perfection that the manufacture of gas-stoves has attained; and he urges that every effort should be made to get people to substitute gas and electricity for coal and coke. The greater part of the article, however, deals with the visible and the invisible emanations of coal and coke. Referring to smokeless fuels —such as coke—he says it should be remembered that the combustion of these pours into the air considerably greater volumes of the negative poisons, carbonic acid and nitrogen gases, and of the positive poisons, sulphuric acid and carbonic oxide gases, than those given off by an equal weight of coal. Hence between coal and coke, he proceeds, it is a question of balancing the disadvantages of the former, which emits perhaps ½ p.ct. of its weight of visible smoke, against the disadvantages of the latter, which emits (say) 25 p.ct. more sulphurous acid than coal. That is, of course, only part of the question, and upon that part few people are in a position to express any intelligent opinion. Looked at practically, coke is produced in the carbonization of coal; and more or less in all the products, particularly in the gas, some of the sulphur of the coal is found. In the gas purification process, recovery is made of a large part of the sulphur. Therefore, what the coal loses in the way of sulphur, and is recovered from the gas, cannot be in the coke. Of course, in gas manufacture, a ton of coke (according to the system of production) might be originally represented by anything between 1½ tons to 2 tons of coal; and, if we take the total gas and coke from the 1½ to 2 tons of coal, and treat it all as fuel, will that gas and coke together emit into the atmosphere more sulphurous acid than the combustion of the original coal? Therefore, if we accept Prof. Arnold's figure of 25 p.ct. more sulphurous acid from a ton of coke than from a ton of coal, this does not settle the question as to whether it is not preferable to have that addition than for humanity to suffer from the sun-obliterating effects of the smoke emanations of coal. But this is not the only consideration in trying to arrive at a balance of advantages and disadvantages. Supposing that 25 p.ct. addition to the sulphurous acid is the price paid to clear the air from smoke, there are movements going on that will tend, despite the use of coke, to lessen the quantity of sulphurous acid that is transferred from domestic and factory chimneys to the atmosphere. Prof. Arnold states that in a town in which there are 100,000 domestic fires, each burning (say) 56 lbs. of average coal per day, they are in the agregate pouring into the atmosphere about 2,500,000 gallons per day of sulphurous acid gas. The complete displacement of that coal by coke in such a case would only raise the figure to 3,125,000. But displacement by coke is not the line of development. Progressively gas is evicting coal for domestic purposes; and every gas-fire, gas-cooker, or gas-heated water apparatus that displaces coal burning means something less in the way of smoke and sulphurous acid being transferred to the atmosphere. This being so, the combined use of gas and coke for domestic and industrial purposes will not only diminish the smoke evil, but will considerably lessen the quantity of sulphurous acid that is to-day passing into the atmosphere through the burning of coal. And still one more consideration—Mr. Nicol's article shows that for steam-raising, combining coal and coke or breeze, higher efficiencies and duties can be realized, and at reduced cost, compared with the use of coal alone.

Smoke abatement is a large problem with many sides to it. The difficulty appears to be to get men to examine the whole of those sides before adopting a definite attitude in regard to the general question.

Our Haphazard Sulphate of Ammonia Methods.

"IT is not edifying in these days of scientific control to re-"flect on the somewhat haphazard methods prevailing in "so many sulphate of ammonia works. Bye-products "ought surely to be manufactured under as economical "conditions as possible, compatible with the quality of the "article produced. The whole process of the treatment of "ammoniacal liquor seems to be worthy of more attention "at the hands of manufacturers than it receives." This reproach appears in the annual report of the Chief Inspector of Alkali, &c., Works for England and Wales (Dr. T. Lewis Bailey). He refers to two points as being specially worthy of consideration—first, on the ground of economy, and, secondly, by reason of the present-day difficulty, so frequently experienced, of getting rid of spent liquors. This alludes to the questions of lime and steam used in the still—the one being a case of the amount of alkali actually required to bring about the setting-free of the fixed ammonia; the other is a question of the heat units needed in the distillation process. The charge is not made in a form which suggests that all sulphate of ammonia plants are worked by haphazard methods; but there is no acknowledgment—or insufficient—that a very great improvement has been effected by producers in various ways in connection with their working. There are greater efficiencies to-day than formerly in both quantity per ton of coal carbonized and quality of sulphate made. Neutralizing and drying have become quite common advantageous practices; and our columns have borne testimony to investigation that has been made in respect of the economies to be effected in lime and steam. The Chief Inspector for England and Wales makes passing mention of the fact that the outstanding feature at present is the general tendency towards the production of neutral sulphate; while in the report of the Chief Inspector for Scotland (Mr. J. W. Young) neutralized salt is mentioned, but only in making the point that its drying tends to be over-elaborated, and at too high a temperature, so that afterwards it is necessary to crush down or grind the lumps. For drying, none is so effective as the simpler plants, wherein an ample and steady current of warm air is led through the agitated salt.

It cannot be denied, however, that Dr. Bailey's criticism

respecting the excessive quantities of lime and steam used in the process is well founded; and that there is considerable scope here for greater economies, to the attainment of which both the manufacturers of the plants and the makers of sulphate could contribute. Sulphate of ammonia is an article in competition with other fertilizers; and therefore the larger the production economies effected, the stronger its commercial position. Moreover, for the sake of our technical reputation, there should not be the opportunity for anyone to point to the prodigal use of lime and steam which, we are afraid, still largely abounds. The criticism recalls the paper that Mr. P. Parrish read at the annual meeting of the Society of Chemical Industry last year. In it he showed that steam is the dominant factor in the still operating costs; but the efficiency of the process, from the heat conservation point of view, is only 32·5 p.ct. Taking the normal production of sulphate of ammonia as 300,000 tons a year (which is very much on the low side), Mr. Parrish stated that by a modification of the arrangement of distilling plant, the cost of steam for that production (which steam represents something like £270,000) could be reduced to at least one-half that sum. This would represent (say) £135,000 a year, or 9s. per ton of sulphate. A singular thing is that, though to this potential economy attention was directed in such a prominent manner, little consideration appears to have been devoted to it. Had there been more interest shown, Dr. Bailey would have acknowledged it, and not made the deserved censure as to haphazard methods. We are wondering what Dr. Bailey will think of Mr. E. Lloyd Pease's system for extracting ammonia from gas, and making the "N.P.K." fertilizer [see "Journal" for June 20] in which process there are no effluents, and no steam or power is needed, except for a mixing trough and a revolving tube.

The report supplies further information as to the investigation of the treatment of spent effluent from the distillation of ammoniacal liquors. The difficulties that arise from the disposal of effluent spent liquors have been very generally experienced; and both gas-works and coke-oven owners of ammonia plants will welcome the research that Dr. Bailey and his staff are making into this subject. The investigation is still in progress; and the results at the Hornsey Gas-Works have been such that there is encouragement sufficient to continue by development along the same lines as were indicated in the previous report. One cause of the research being incomplete is that there has been delay in the erection of plant at works where novel features have been introduced that were lacking in the experimental scrubbers erected at the Hornsey Gas-Works. It is satisfactory to learn that, since their erection in February, 1921, the decolorizing and dephenolating scrubbers at Hornsey have successfully dealt with the whole of the effluent liquors produced in the manufacture of 2½ to 3 tons of sulphate of ammonia per twenty-four hours. Further improvement has now been effected in the character of the final effluent discharged—analysis indicating a volatilization of 71 p.ct. of the phenols, with a reduction in the figure for oxygen absorbed of 42 p.ct. But there is a trace of disappointment in the report, in that the percentage purification effected cannot be regarded as fully coming up to expectations in view of the results obtained in the laboratory. The results from laboratory methods and refinements are rarely realized when there is transference to working-scale practice. It is pointed out that the improvement in the character of the liquor, *quâ* reduction in the figure for oxygen absorbed, effected by blowing with boiler fire gases, appears to be due in great part, if not entirely, to the volatilization of the phenols. Arrangements are now being made at the Hornsey Gas-Works to submit the effluent from the ammonia distillation plant to double treatment, by passing the effluent liquor from the dephenolating scrubbers on to a filter-bed charged with specially activated material for treatment by bacterial action prior to discharge from the works. Facilities are being provided for sampling the treated liquor at various stages in the process; and the results of the analyses should afford data of value to those who may be faced with similar problems. Another useful section of the report is a discussion of the volume and character of the effluent liquors to be treated.

As to the production of ammonia products, expressed as sulphate, 25¾ p.ct. ammonia, it is distinctly picking-up, though still somewhat remote from the figure of 397,937 tons, which was the return in 1920 for the United Kingdom. The coal stoppage in 1921, trade depression, and the consequent shutting-down of coke-oven plants have had a substantial effect upon production. The returns are now made separately for England and Wales by Dr. Bailey, and for Scotland by Mr. Young. In England and Wales last year, the production was 275,301 tons, and in Scotland 75,841 tons—together 351,142 tons, or 46,795 tons below the production of 1920 for the United Kingdom. There is little use, in view of the coal stoppage and unfavourable industrial circumstances, making comparison of last year's statistics in this regard with those for 1921, other than to say that in 1921 upwards of 100,000 tons less were made than in 1922. Taking England and Wales alone, the quantity of sulphate of ammonia made in 1922 was 275,301 tons; while in 1920 it was 298,093 tons—a difference of 22,792 tons. The production in Scotland last year was 75,841 tons, compared with 96,804 tons in 1920—a difference of 20,963 tons. The difference between the production in 1922 and 1920 of England and Wales is mainly due to the coke-oven plants not having regained their numerical working level of 1920. As a matter of fact, the English and Welsh gas undertakings, in yielding 144,817 tons, exhibited an increase of 838 tons; while coke-oven plants, which produced 143,391 tons in 1920, only yielded 125,679 tons last year—a reduction of 17,712 tons. Ironworks showed a falling-off of 635 tons, and producer-gas and carbonizing works (bone and coal) a lower output by 5283 tons. In the aggregate we do not suppose that more coal was carbonized by gas undertakings in 1922 than in 1920; and if this is so, then the higher production of sulphate by gas-works must be attributed to increased efficiency—more especially seeing that not a few of the smaller undertakings were running their liquor to waste last year rather than recover the contained ammonia. However, the figures point to good recovery of output, despite the fact that the costs of production have not receded *pari passu* with the market price of sulphate of ammonia.

Tar Distillation.

In the annual report of Dr. T. Lewis Bailey, Chief Inspector for England and Wales under the Alkali Works Regulation Act, reference is made to a few points connected with tar plants. We have been hearing a good deal lately about the innovation in tar distillation of the use of a molten metallic alloy for heat transference in the still. In each section of the plant, the tar is fed-in below the surface of a molten lead alloy, maintained at the desired temperature. It is thought that successful development of this variation from the usual plan of direct heating of the tar may have quite a number of advantages, including prevention of the separation of the carbon. Mention, too, is made of the want of attention to pitch coolers at some works, and to the nuisance caused by leaky ones. Fume pipes are all too frequently neglected. There is no difficulty whatever in providing and maintaining a pipe from the top of the pitch cooler to ground level, which is lightly sealed in oil or water. This is simple and quite efficacious. Further, a successful expedient in minimizing still corrosion has been found in aluminium oleate, which may be prepared from oleic acid and such an aluminous material as alumino-ferric. In England and Wales, the total quantity of tar distilled in 1922 is returned at 1,185,994 tons; and the pitch produced at 452,883 tons, or about 38 p.ct. of the weight of the tar distilled.

Shunting and Siding Charges.

We are asked to call attention to the revision of shunting and siding charges for privately owned wagons stopped for repairs. An announcement on the subject appears in our news columns. Negotiations have been proceeding which have resulted in an experimental arrangement for twelve months to accept a commuted charge of 1s. per annum on the total number of wagons owned by each trader, in lieu of the present charges for shunting and siding rent on wagons stopped for repairs, provided that an assurance is obtained from the wagon owners and trade associations that the arrangement will be applied to at least 90 p.ct. of the privately owned wagons (including colliery wagons) running on the railway companies' lines. This does not include wagons only used within works. The change will mean a saving not merely of money, but of trouble in maintaining records and settling disputed items. The full announcement should be read, as it is desirable that assent should be at once notified as directed. The

prime movers in the matter are very anxious that the scheme shall prove effective by securing the needed co-operation. Where economies are so visible, this should not be difficult.

The Starting of a Fire and a Story.

Hearsay evidence is always dangerous until authoritatively corroborated. There was a fire recently at the Highbury (Birmingham) Hospital for Army Pensioners, and two lives were lost. The newspapers published reports regarding the loss of life, and the damage done; but the then assigned causes of the outbreak, it has now been proved, were purely guesswork. Certain papers said the fire was due to a gas-geyser; others to a gas-heated water-boiler; others to a towel being placed on a geyser to dry. Now the inquest has been held on the two unfortunate men; and the truth is that the fire was caused by the ignition of leaking floor-polish from a tin, to which polish some turpsine had been added for the purpose of making it more liquid. The instructions were that the warming of the polish in the tins to allow of the absorption of the turpsine should always be done in the open. Instructions are one thing; compliance with them another. The facility for warming indoors could not be resisted. On the day of the fire, a tin containing polish and turpsine was put on top of a boiler, without knowledge that in the bottom of the tin there was a tiny hole. The tin was left. Naturally, as the contents became warm and liquefied, the polish dropped on to the surface of the boiler, and a volatile vapour was given off. The rest is plain. Yet the story started by ascribing the cause of the fire to a gas geyser!

Miners' Wages.

The information is given by the Labour Correspondent of the "Daily Telegraph" that there is to be another attack upon the national wage agreement in the coal-mining industry at the annual conference of the Miners' Federation this week. Whatever may be its defects, the agreement provides the workers with a fixed minimum wage, and gives them the right of sharing in the surplus income to the extent of 83 p.ct. The wage rates for July and August are the best which have so far been obtained since the agreement came into operation. In the Scottish coalfield, the correspondent states, the men receive an advance of wages from July 1 of no less than 45·58 p.ct. on the basic rate. In Northumberland the men receive an increase of as much as 33·4 p.ct. In the coalfields of Yorkshire, Derbyshire, Nottinghamshire, Leicestershire, Warwickshire, and Cannock Chase, there is a rise of 4·04 p.ct.; but in this area there has been a steady and regular advance in the percentage, which is, perhaps, an even better indication of sound trading conditions than a sensational jump. The workers in Durham receive an advance of 18·24 p.ct. The South Wales miners for the first time obtain an advance above the minimum of 9·6 p.ct. This means that of the 1,085,312 men and boys working in the industry, no fewer than 905,997 are in areas where wages are above the fixed minimum.

The Railway Outlook.

There is a deadlock over the railway companies' demand for the reduction by 6s. 6d. per week of the war bonus to railway shopmen. Neither the shopmen nor the National Union of Railwaymen are disposed to go further along the road which will put the former in a position of equality with the men employed in other engineering trades. The reason for a preferential distinction for them is not altogether clear. Now the railway companies are asking in respect of all grades for the withdrawal of the guaranteed day; the withdrawal of overtime payment for all night work between the hours of ten and four; for the right to call men on for split duties of not less than two hours at the higher rate for Sunday work; and the entire withdrawal of the mileage system of payments, and offer as compensation to the drivers of such trains an additional 1s. per day, raising the wage of drivers of six years' standing of express trains from 15s. to 16s. per day. The national wage agreement provides for all drivers and motormen a uniform wage ranging from 12s. to 15s. per day, based on the years of service. In some quarters it is stated that we are drifting towards a railway crisis; but both the railway companies and Mr. J. H. Thomas, M.P., deny this. They say the position is one for which the machinery for dealing with differences in the railway world is quite adequate. On the other hand, there are men in the Union who proclaim that they will bring to bear all their power rather than concede what is desired. It is not a question of concession; it is one for the utilization in a constitutional manner of machinery agreed upon for the settlement of such matters.

PERSONAL.

Messrs. Vickers-Petters, heavy oil engine manufacturers, of Ipswich, announce that they have appointed Mr. A. P. LAUGHLAND as their Midland Representative; the offices being at Union Chambers, Temple Row, Birmingham.

At Great Harwood (Accrington) Gas-Works, last Thursday, Mr. J. MACBAIN, for two years Carbonizing Manager, who is leaving to take up a private position, was presented with a handsome suit-case, subscribed for by the staff and men employed at the works. The presentation was made by the Chairman (Alderman D. C. Dewhurst, J.P.), who said they were sorry to lose the services of Mr. MacBain, and wished him success in his new venture. The Mayor (Councillor Woolley) remarked upon the pleasure it gave the Board to find such good feeling existing between the General Manager, the staff, and the men at the works.

SHALE OILS AND TARS, AND THEIR PRODUCTS.*

Reviewed by Dr. C. H. LANDER.

THE experiences of the author, gained from his connection with the Saxon-Thuringian mineral oil industry, as well as his close personal touch with the Scottish shale oil industry and the production of distillation tar at Messel, have enabled him to offer a valuable work on the treatment of both bituminous shales and lignites for the production of oils, and on the preparation and purification of the finished products.

The subject is treated in a logical manner, beginning with a short, but comprehensive, history of the shale and lignite tar industries, with special reference to the Scottish shale oil industry and that of the Saxon-Thuringian branch of lignite mining of Germany. A useful and interesting chapter on bituminous raw materials is followed by others dealing with tar production, the tars themselves, the distillation of the tars and oils, tar and distillate refining, and the manufacture of paraffin wax and candles. The laboratory work necessary for testing the raw materials, products, bye-products, and reagents is dealt with in the penultimate chapter.

The question of home supplies of fuel oil has become increasingly urgent during the past ten years; this urgency having been emphasized by the dangerous shortage which made itself felt during the war. It has been said that oil is the key to all forms of transport, whether by land, sea, or air; and there is little doubt that, were it more easily obtainable, oil would seriously rival coal for stationary power production. The Scottish shale oil industry has only survived the competition of natural petroleum by the skill and patience with which it has been fostered on the scientific and technical sides, and by the development of markets for the refined products.

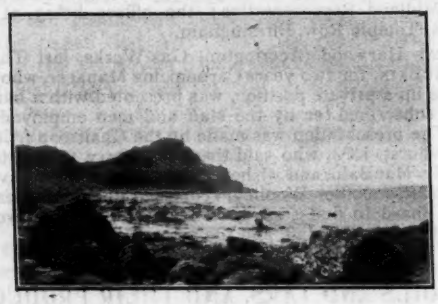
The shale oil industry offers considerable possibilities of expansion by the utilization of the large shale reserves which are known to exist both in this country and abroad. Its development, however, will always be checked by the periodical slump in prices of natural petroleum products. It is of the first importance that the technical side shall be given a foremost place in the minds of those responsible for development projects; and Dr. Scheithauer's book cannot fail to assist in this direction. Experience has shown only too clearly that a closer study of the development and working of shale distillation would have gone far towards the prevention of some of the costly failures associated with schemes for the low-temperature carbonization of bituminous coal.

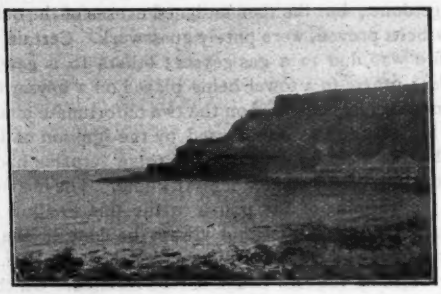
The value of the book has been increased by the excellent work of Mr. H. B. Stocks, F.I.C., in the revision and enlargement of the present edition.

* "Shale Oils and Tars, and their Products," by Dr. W. Scheithauer. Second English Edition; revised and enlarged by Mr. H. B. Stocks, F.I.C. Messrs. Scott, Greenwood, and Son, No. 8, Broadway, Ludgate, E.C. Price, 12s. 6d. net.

Making Copper Pipe Bends.—An important process for the manufacture of copper pipe bends from the sheets by hydraulic stamping has been patented by Messrs. D. Harvie & Co., Clydebank Works, Rutherglen. A demonstration was held recently in the works of Messrs. Mechans, Ltd., Scotstoun, when a test was carried out on a 12 in. diameter bend, 7 i.w.g., at a 2 ft. 3 in. radius. The pipe when bent was fully a quarter-circle. The plates used for the demonstration were put into the press as they had left the rolling mills. No annealing was required from start to finish; and the demonstration was carried out in the remarkably short time of twenty minutes. The result appeared to justify fully the claim of the inventors that the process will revolutionize methods of making copper pipe bends both for marine and land purposes. The present method is by hand labour; and for the new process the claim is made that it increases the efficiency of the material by 100 p.ct.

"SNAPPED" IN IRELAND.



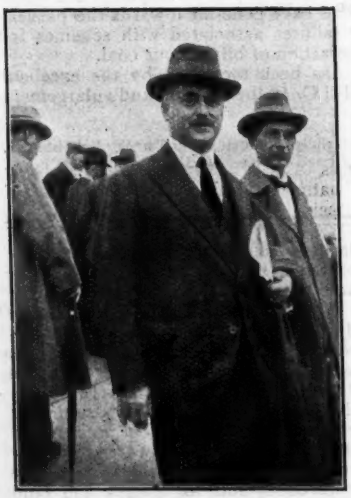


Views at the Giant's Causeway.

The Manager of the "B.C.G.A."

The Secretary of the Institution.

Alderman and Mrs. Fred. West.

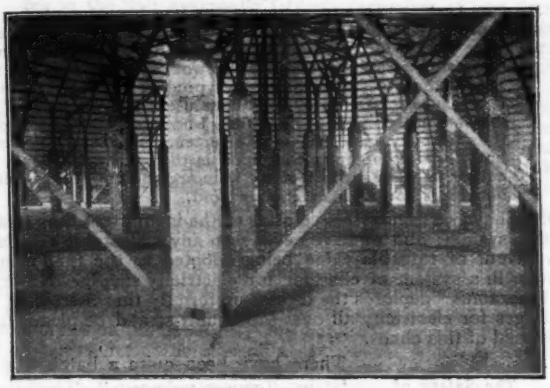


Mr. Philip Holmes Hunt and Mr. B. R. Parkinson.

Mr. and Mrs. Smith, with Mr. and Mrs. Doig Gibb, and Mr. and Mrs. Hardie.

Mr. W. B. Leech.

THE NEW BELFAST HOLDER.



AN "INTERIOR"—Showing the Umbrella Framing for supporting the Crown of the new Seven-Million Spiral-Guided Holder.

ELECTRICITY SUPPLY MEMORANDA.

THERE is not the same disposition now as there used to be on the part of electrical men to ascribe to town gas all explosions that occur in connection with their own distributing systems. That sort of thing was stemmed some years ago; and to-day greater care is taken in making such charges, although at times we still find an inclination to look to town gas as the primary cause, and to electricity as the secondary or ignition cause. Town gas was all too long the victim of the hypothesis that no other explosive gas could possibly be present. Belfast has been through the same experience as other places in this regard. This is found in the highly interesting paper which Mr. A. M'I. Cleland read at the annual meeting of the Institution of Gas Engineers, as published in the "JOURNAL" last week. It was 25 years ago that Belfast had its first experience of an explosion in an electric culvert; and in the electrical system mysterious explosions continued for several years. For these no satisfactory explanation could be found. The Belfast Corporation Gas Department, however, do not take charges against them lying down; and very thorough searches were made for any escapes of gas from the distributing mains, but invariably none could be discovered. So matters went on; Mr. Cleland being convinced that there was a problem that had not been, but would have to be, solved. Then came the disastrous explosions at Nottingham and Hebburn-on-Tyne. In August, 1913, Prof. W. M. Thornton and Dr. J. A. Smythe, of the Armstrong College, Newcastle-on-Tyne, reported on the Hebburn explosion; and their report was headed "Gaseous Explosions Caused by the Electric Heating of Bitumen in Cable Troughs." The secret was out. The report constituted a scientific pronouncement that bitumen in contact with fused electric cable would generate a gas which, mixed with air, was more highly explosive than coal gas. This put Mr. Cleland on the high road to removing in his case town gas from the position of culprit. If no straying town gas could be found in the neighbourhood of an explosion, and if lengths of fused cable (with bitumen surrounding) had to be removed by the Electricity Department, then there was no need to hunt farther for the cause. As we say, there has been less allegation, and gas has not been pilloried so often, in connection with these street explosions as formerly was the case. There have been explosions in Belfast since, as elsewhere; but in these instances the trouble has been found to have occurred in connection with the electric cables, but gas-main defects have not been traceable. In one of these Belfast explosions, six houses were wrecked—one occupant was injured, and another suffocated. The explosion was of such a violent character that people in the neighbourhood thought a bomb had exploded. The constitution of bitumen gas is such that it is highly explosive, and so unpleasantly forcible.

Street Explosions.

From the discussion on Mr. Cleland's paper, other experiences issued. Mr. S. B. Langlands spoke of similar troubles having been experienced in Glasgow. Reminder was given by Mr. Stephen Lacey (Chief Distributing Engineer of the Gas Light and Coke Company) of the Board of Trade inquiry in 1914 into the subject of explosions in electricity street culverts and boxes, and of the report that was then issued by the Departmental Committee. Mr. Lacey is of opinion, and we agree, that every gas man who has trouble with electric cables should read that report, in which vulcanized bitumen was condemned as an unfit material for cables. Readers will find the main parts of the report in the "JOURNAL" for July 7, 1914 [p. 47]. Mr. Lacey mentioned that in his Company's area there are two or three electricity supply undertakings with the three-wire continuous current system, and nearly all the troubles have been with the cables in those districts. In one district there have been hundreds of faults in the last three or four years—sometimes resulting in the fusing of service-pipes. There was rather a serious occurrence at Chesterfield only about four months ago, when three large boxes were blown up in connection with an explosion from electric mains, due to an electrical fault. When Mr. Harold Davies, the Gas Engineer, called attention to the fact that bitumen-covered cables would generate gas, and cause an explosion, he was met by the statement that the cables were covered with paper, and were also armoured, and that consequently no gas could arise from that source. Mr. Davies obtained a piece of the cable, and satisfied himself that, even so, a gas of an explosive character could be generated. He offered to demonstrate this to the Chairman of the Electricity Committee; but the offer was declined. The Electricity Committee paid the whole of the costs. This speaks volumes. This reference to paper-covered and armoured cables is interesting. Dr. A. Parker, on this point, says it may be possible that the paper insulation would give rise to gas. If one can get gas from bitumen or other insulating material, it is also possible to get it from a defective cable resulting from a distillation of the cellulose constituents of the paper insulation. Samples of the gas should be secured and analyzed; and this would give some useful information for comparison with town gas. Whatever the character of cable, it does not do to assume that an explosive gas cannot be generated on fusing occurring.

Other Experiences.

Home truths are not always welcome. Alderman Smith told the Hastings Town Council the other day that the Electricity Department had cost the rates £30,000; and now that in one year a profit had been made of £11,000, the Electricity Committee had got hysterical about it. The point was made on a proposal that the Electrical Engineer (Mr. Ferguson) should be presented with a sum of £500 in consideration of the extra services that have devolved upon him; but the matter was referred back to the Committee for further consideration and report. The Committee should husband their resources. It is a moot point as to whether they will not have again to fall back upon the rates. The position is this: The electricity supply business has been increasing, the plant is not all that it should be at the old station, and there is no room for extensions; but there is a lot of unliquidated capital represented in the generating station which will still require interest and sinking fund. But now the Corporation have committed themselves to heavy expenditure in constructing a station on a new site; and the Electricity Commissioners, it appears, have approved of the estimates that have been made. The computed outlay is £144,970; and there will probably be an additional £3000 for a railway siding. Thus, roundly, the first expenditure involved is £150,000, assuming the estimates have been correctly made. Interest and sinking fund will mean a fairly weighty business on that sum. The charges for current have been reduced. How long will the Department be able to show a decent net profit; alternatively, how long will the charges for current remain at their present figure? We shall probably be faced with the statement that the new plant will produce fuel and other generating economies. Generating costs only represent about 25 p.ct. of the outgoings of an electricity station; capital charges about 50 p.ct. Evidently the construction of a new station is imperative; but the Hastings Electricity Department are certainly not in the most enviable position for incurring such a large expenditure. The Council should not place upon a single year's profit too much reliance as to what may happen in the future. The capital was heavy with which they, upon the transfer of the business, entered into municipal trading in electricity supply.

Profits and New Capital Expenditure.

There are a number of gas-engine driven electricity stations doing excellent work; and numerous generating plants so driven are in operation on gas-works, where reliability of the electrical power is a *sine quâ non* to the running of the gas plant. The wholesale demonstration of this reliability is important, as many electrical engineers hold the view, or assert that they do, that the gas-engine is not a thing upon which one can place dependence. They speak from a detached and prejudiced standpoint, and not from any personal experience. In an article in the "Electrical Review," Mr. M. S. Mason supplies some hints as to points that should be kept in mind in designing gas-engine driven stations. Among them are these: In steam-engine practice, an engineer usually keeps his sets as large as possible, in order to take advantage of the increased efficiency which is attained with a large set compared with a smaller one. In the case of gas-engines, however, the efficiency is practically the same whatever the size. Assuming gas at 500 B.Th.U. per c.ft., and at 2s. 6d. per 1000 c.ft., the writer says that at ¾ load, the consumption is 3 c.ft. more than at full load per KW. generated; at ½ load, 9 c.ft.; and at ¼ load, 30 c.ft.—the cost being: At full load, 0·9d. per KW.-hour generated; at ¾ load, 0·99d.; at ½ load, 1·17d.; and at ¼ load, 1·8d. In Mr. Mason's opinion, these figures prove that, if a gas-engine station is to pay its way, all the engines must work at practically full load for the whole of the time they are running. As he admits, this for a small station is rather a tall order. Nevertheless, he says it can be accomplished if proper consideration is given to the station's various loads at the time of laying down the plant, and when ex-

Gas-Engines for Central Stations.

tensions are made. He has seen numbers of stations where the gas sets were either all the same size or in two sizes, and in these cases, from the engine point of view alone, it was quite impossible to get good figures over the twenty-four hours. He assumes that for six months of the year, and for twelve hours each day, a 100-KW. engine is only running at 60 p.ct. of its load. This means that 131,000 KW.-hours are generated, costing 1·08d. per KW.-hour generated, or £98 more than if a 60-KW. generator had been available. Taking a station with a minimum load of 50 KW., and a maximum of 350 KW., with a probable total capacity of 550 KW., the sizes of sets to obtain the best results would be: One of 50 KW.; one of 100 KW.; and two of 200 KW. The combinations available will at once be seen to be: 50 KW.; 100 KW.; 150 KW.; 200 KW.; and so on in 50 KW. steps up to 550 KW. This reduces to a minimum the likelihood of running sets at a disadvantage. Speaking of the reliability of gas-engines, he submits that the size of a battery should be governed by the size of the largest set. The battery should have the same amperage as the largest set, on both charge and discharge, and should be able to deal with the same load as the set for one hour. Later on, he points out that two big factors in favour of gas stations as compared with small steam stations are lower capital and wages costs.

A Definite Price Basis.

The "Electrical Times" has done an inestimable service in proving, by the publication of the multitude of electricity tariffs in use in this country, that confusion reigns supreme in the industry as to the fundamental lines on which business should be conducted as between purveyor and buyer. What can be expected but confusion in the public mind when such a state of things exists? In such circumstances, there is no possible means for the public to make comparison as between the charges in one area and another, for the simple reason that they have no comparable basis. This cannot be alleged against the gas industry. At one time, charges were not strictly comparable; but there has been a change. With all the poor ridicule that electrical journalists have tried to heap upon the therm, thus certifying their own lack of intelligence in respect of a purely elementary factor in trading, they cannot now deny that a more definite basis for charging could not obtain. A "therm" being 100,000 B.Th.U., and a B.Th.U. a positive physical quantity, the therm as a basis of charge as between one district and another, or between one consumer and another, is something that is constant; and there is no difficulty whatever now, wherever the therm has been introduced, in consumers making price comparisons on a positive basis, with nothing intruding to vitiate them. But how can electricity consumers do this, with such mongrel tariffs as those based on (say) rateable value or area of rooms of the one part, and the unit of electricity of the other? And these are only specimens of countless variations of tariff that have been devised for the purpose of fostering business, but which simply confound the consumers. If the publication by the "Electrical Times" of the heterogeneous crowd of tariffs has the good effect of showing the absurdity of it all, and leads to an attempt at co-ordination on a definite basis, our contemporary will have done good service. The Electricity Commissioners are charged with the attempt to bring about co-ordination at the generating end; it is a pity they cannot accomplish something in the way of price co-ordination at the trading end, which is equally imperative and important. The Board of Fuel Research and Parliament have accomplished that service for the gas industry.

Tariff Diversity.

There is a good deal of common sense in an article on the subject in the same contemporary, by one signing himself "Ignoramus." The contribution indicates that he is not such an ignoramus as he pretends to be. The "Electrical Times" describes him as an "intelligent outsider." An "intelligent outsider" may be a very useful person to an industry in which exists, as is attested by the publication of the pages of multiform tariffs, such a vast amount of unintelligence in respect of appreciation of the requirements of the public for a common-sense basis of charge. "Ignoramus" is not an electricity supply engineer, for which he thanks a merciful Providence. Representing the public view, he says there is no getting-away from the fact that the simple charge for gas of so much per 1000 c.ft. is an enormous advantage. He admits that perhaps he ought to have said "charge by the therm," which "move" by gas undertakings he thinks was in the wrong direction. It was not a "move" by the gas undertakings; it was a move by the Board of Fuel Research, which was adopted by the Board of Trade and Parliament. The wisdom of the "move" is receiving growing public recognition. "Ignoramus" himself confesses that the charge is universal; so that whether he goes to live in Northumberland or London the gas bill will be in the same form, and he will know precisely what he is paying per therm as compared with people in other districts. But electrical tariffs only befog the consumers. He admires the flat-rate for electricity—as practised, for instance, at Brighton—with a sliding-scale of price for quantities. The Electrical Engineer of Brighton finds that his flat-rate system answers admirably, and is easily understood, and that if a consumer is a power user, and takes any reasonable quantity at 1½d. per unit, his average will compare more than favourably with most of the multiple tariff charges. Many of the other tariffs merely provide opportunities for mental gymnastics. As to the rateable value system, he admits that this is not difficult to understand; but is it, he asks, equitable? A quotation shows that his own reply is in the negative:

> Suppose I take a house in a street with a rateable value of £40 and the primary charge is 25 p.ct. of the rateable value, I would have to pay £10 *plus* 1½d. (say) per unit; but another person occupying a house assessed at £20 would pay only £5 *plus* 1½d. It costs the undertaking no more to produce the units I use than to produce the units my neighbour uses; and why should I be mulcted in the extra £5? In fact, I notice at Halifax the lower the rateable value the lower the percentage as the first charge; but the price for units consumed is the same. No doubt the author of these tariffs will say I am arguing on false premises; but this is how it strikes the lay mind.

Often have we argued this point as to the inequity of the rateable value system; and we have never seen any acceptable reasoning in favour of rateable value being adopted as the fundamental factor in a system of charging for electricity supply. However, "Ignoramus" deplores the lack of uniformity that there is in the charges for electricity all over the country; and he pleads for a reversal of this chaos.

The Safety of Electricity [?].

There have been quite a batch of fires lately—"causes unknown." There have also been several attributed to the fusing of electric wires. Wiseacres, hundreds of miles (more or less) away from the scenes of the mishaps, as a rule, make a feeble effort at refutation. But they have not had much to say as to the fire at the Winton House Preparatory School, Winchester, or as to the fusing in a passage underneath the Blackpool Tower Ballroom, or as to the fire on premises of the Scottish Co-operative Wholesale Society in Glasgow. Now the intelligence comes from Pekin that the three famous palaces known as the Chung Cheng-Tien, the Chein Fu-Kung, and the Yen Chun-Keh are among those destroyed by fire within the Forbidden City. Many priceless works of art were lost; while portraits and other irreplaceable treasures were destroyed. The origin of the fire is attributed to defective electric wiring. This in the palaces of Emperors! The "Daily Mail" should make note of these things. It has not lately tried its luck at sensation raising—not since it made such a pitiful exhibition of itself in connection with gas accounts and the therm. The public are getting very doubtful as to the "safety" of electric lighting. They know when a wooden panel gets burnt through, and a damaged electric wire is at the back, that the menace to their homes has not been caused by a dropped cigarette end or a lighted match. These comparatively small troubles, to our mind, are rather convincing as to the accusations against electricity in respect of large conflagrations.

MECHANICAL PROTECTION DEVICES FOR COAL CRUSHERS, &c.

By STANLEY JONES, of South Melbourne.

[**A Paper read before the Victorian Gas Managers' Association.**]

The device which is described in the following paper is the outcome of experience gained on one of the coal crushers at the West Melbourne Works. This crusher was driven by an electric motor, and was equipped with a flange on one of its driving shafts, against which worked a spur gear which was free to revolve on the shaft; a hole being drilled through the flange and the boss of the wheel, through which a bolt was threaded. The idea was that should a piece of iron, wood, or other obstruction get into the crusher, the bolt would be sheared before any damage was done to the crusher rolls or gearing. The size of the bolt was presumably calculated on the shear strength of the material and the maximum load which the crusher would stand before damage occurred. It was found, however, that the bolt failed with distressing frequency, sometimes with only a light load; and this trouble was not eliminated till the bolt had been increased in size to such an extent that it was too strong to carry-out the purpose for which it was designed, and the crusher shafts would be twisted, or gears broken, before the bolt would fail. In the course of an investigation of the subject, the following conclusions were reached.

(1) That the electric circuit breaker was no protection mechanically, as it did not throw out until a load had developed greater than the maximum normal load, after which the momentum of the rapidly-revolving armature of the motor had to be absorbed. This developed such enormous pressure on the gearing and crusher rolls that something had to go. In this case it was usually the long shaft, on which the flange and spur wheel above-mentioned are situated, which got badly twisted. Sometimes one of the pinions stripped. The circuit breaker, therefore, only acted as a protection for the insulation on the motor.

(2) That the reason of the failure of the shearing bolt to act in a proper manner was that the elastic limit of the material was only about half of its ultimate breaking strength. The sectional area necessary for the bolt to fail at a given load had, of course, to be calculated on the ultimate shearing strength of the material. Hence, unless more than 100 p.ct. margin over maximum normal load was allowed for, the elastic limit of the material would be passed at ordinary

loads, and distortion or partial shear would occur, resulting in the bolt eventually failing—very often at less than normal load. In practice, it was found that a further allowance had to be made, as the local bearing pressure on the bolt close to the division between the flange and the boss of the wheel was too great.

(3) That the difficulties outlined above could be eliminated by the utilization of hard drawn-steel wire, as the breaking element of this substance, owing to the process of its manufacture (*i.e.*, drawn through hardened steel die plates), has its elastic limit artificially raised, and by passing through the die plates several times without annealing can be made so that its elastic limit almost coincides with its ultimate breaking strength.

In its practical application, a number of turns of wire are coiled round two steel bobbins separated by a wooden distance piece; the wire being tightly wound, and the two ends securely fastened by set screws on the bobbins. One bobbin is threaded in a steel pin projecting from the side of a spur wheel, which is free to revolve on its shaft. On this shaft is keyed an arm carrying a pin at its extremity, on which the other bobbin is threaded. It is so arranged that the centre line of the pins on the wheel and arm forms a right-angle with the centre line of the arm itself. Thus when the wire breaks, the wooden distance piece falls out, and the spur wheel is free to revolve without driving the shaft, the the pins clearing one another, as the distance of the pin on the wheel is greater than that on the arm from the centre of the shaft. It will be noticed that the stress on the wire in this arrangement is tensile only; there are no bearing or other stresses which would affect its reliability.

The number of turns of wire required is calculated on the individual strength of one strand divided into the tensile stress which would occur at the centre line of the two pins on the wheel and arm, assuming a certain maximum overload. On the crusher at South Melbourne which is equipped with this device, it was found necessary to employ nine turns of wire, giving an overload of 75 p.ct. on the rated capacity of the motor driving the crusher. As the starting load for the crusher often approximates 30 H.P., the margin of 75 p.ct. on the rated capacity of the motor only gives a real margin of 45 p.ct. over the maximum momentary load which the crusher is likely to undergo. With this margin, the wire breaks before the parts of the crusher are subjected to any stress beyond what they will safely bear. It is interesting to note that when the wire fractures owing to an obstruction getting into the crusher, the motor is invariably left running, showing that the device always acts before the circuit breaker throws out. The circuit breaker is set by practical experiment at as low an amperage as possible, so as not to throw out at ordinary loads.

It was anticipated that there might be some trouble owing to fatigue of the metal of the wire, but none has been experienced. The wire at present in use has been in for some months. Since its installation on this crusher we have had about eighteen pieces of iron or wood in the crusher, which have caused the wire to break without any material damage to the crusher. Many of these pieces of iron were of such a size as we know, from previous experience, would have caused enough damage to necessitate dismantling the crusher and putting in new rolls.

Spare elements, consisting of the two bobbins and distance piece wound with the wire, are kept in readiness to replace the one in use; and it is only a matter of five minutes to do this after the removal of whatever has been the cause of the failure. It is also an easy matter to vary the load at which the wire will fracture, by increasing or decreasing the number of turns of wire. Thus, in any installation, it is possible to arrive at the correct winding by practical experiment.

Another device which has proved useful has been installed on the hot-coke conveyors of the horizontal retort-house at South Melbourne. These have a tension gear on each conveyor, consisting of a pair of "jockey" wheels in a suitable carriage sliding vertically in a steel frame on the return track. The carriages are weighted to give the desired tension. On each carriage is fixed an angle bracket, through a hole in which passes a long threaded bolt with a lock nut on either side. Attached to the top of each bolt is a length of steel-wire cable, which is led by means of suitable pulleys to one end of a bell-crank lever fixed just below the circuit breaker of the motor driving the conveyors.

When the wire cable is pulled, the bell-crank lever forces the handle of the circuit breaker out of contact, and stops the motor running. Thus, when either of the conveyor chains breaks, the tension gear drops, the wire leading to the circuit breaker is pulled, and the motor is stopped very soon after the break occurs. Previous to the installation of this contrivance we often had to replace long lengths of chain owing to the motor running on and piling it up in a tangled mass, which took considerable time to cut out, and caused serious delay to the retort-house work.

Normally, the bell-crank lever is held out of contact with the circuit-breaker handle by a small spring; and the device does not interfere in any way with the ordinary working of the circuit breaker. The long-threaded screw referred to above is for the purpose of effecting adjustments from time to time.

Mr. Joseph Edward Lilley, of Alleyn Park, Dulwich, S.E., Chairman of the Cape Town and District Gas Light and Coke Company, who died in March last, aged 72 years, left £31,885 (net £20,284).

GAS REFEREES' NEW NOTIFICATION.

Under the Gas Regulation Act.

A General Notification of the Gas Referees appointed under the Gas Regulation Act—Prof. C. V. Boys, Mr. J. A. Butterfield, and Dr. J. S. Haldane—has been issued, dated June 15, and is procurable from H.M. Stationery Office, Imperial House, Kingsway, W.C., at the price of 1s. net. Under section 5 (1) of the Act, it is the duty of the Referees to prescribe (*a*) the places and times at which, and the apparatus and methods by which, tests shall be made to ascertain whether any gas undertakers with respect to whom an Order has been made under the Act are supplying gas in accordance with their obligations, (*b*) the method by which any such apparatus shall be verified, and (*c*) the time and form of the reports to be made by the Gas Examiner to the Gas Referees and the local authority or Quarter Sessions (in Scotland, the Sheriff) by whom he is appointed, and to the undertakers, and the means by which the results of the tests shall be made available to the public; and (*d*), under section 9 (4) of the Act, the manner in which the average calorific value for the quarter shall be ascertained.

The Referees prescribe that the provisions of this General Notification, and any supplements thereof, shall be applicable to all gas undertakings for which a Special Prescription shall have been signed and issued by the Gas Referees at a date subsequent to the date of issue of the present Notification. This General Notification shall be brought into force by, and be additional to, the above-mentioned Special Prescription, and shall apply except as varied by the latter. Where there is anything in the General Notification, or any supplements thereof, inconsistent with the Special Prescription for any undertaking, the provisions of the Special Prescription shall be substituted for those of the General Notification, or supplements thereof.

The first section of the Notification prescribes the testing places, service pipes, apparatus, &c., which are to be provided and maintained by the undertakers to the satisfaction of the Gas Referees.

SERVICE PIPES.

The testing apparatus in each testing place named in the Special Prescription shall be connected with the main (or mains) specified by the Gas Referees in their Special Prescription by a service pipe (or service pipes) of not less than ¾ in. internal diameter, which shall proceed direct from the main into the testing place. The service pipe, or pipes, shall be connected to no other main or source of gas supply, and shall be laid with a continuous fall towards the main, and shall be without tap, branch, or provision for connection of any kind, except the arm for testing of pressure, between the main specified and the main tap controlling the testing apparatus. Between this tap and the testing apparatus the gas shall pass through a service governor, which shall be so loaded that the water-gauge pressure of the gas passing to the calorimeter and purity-testing apparatus does not exceed 2 in.

The service pipe shall be extended beyond the testing apparatus to a burner, or burners, readily accessible to the Gas Examiner, at which gas can be burned during the test at a rate of not less than 10 c.ft. per hour, as determined by the rated capacity of the burner, or burners; and the Gas Examiner shall see that the gas is burning at such burner, or burners, at not less than that rate for a period of a least 45 minutes before he makes the first reading of any testing of calorific value, or for a period of at least 30 minutes before he tests for purity. These burners must be so placed that they do not heat the meter or other apparatus used for testing, and may with advantage be used to promote the ventilation of the room. The Gas Examiner shall satisfy himself that the service pipe from which the testing apparatus is supplied with gas for any testing is that prescribed by the Gas Referees.

If the service pipe is of great length or of large diameter, or if for other reason a rate of 10 c.ft. per hour seems inadequate, other burners shall be provided by the undertakers, and shall be used by the Gas Examiner so that the rate of flow is sufficient to clear the service pipe within half-an-hour. In cases where a recording calorimeter is prescribed, provision shall be made for a continuous flow of gas at a rate which will clear the service-pipe within a quarter-of-an-hour.

TIMES OF TESTING.

The times of testing for calorific value at each testing place will be specified by the Gas Referees in the Special Prescription for each undertaking; but in this Notification they prescribe that not more than 10 p.ct. of the number of tests made with a non-recording calorimeter at any testing place in the quarter may be made between the hours of midnight and 6 o'clock in the morning, unless otherwise provided in the Special Prescription. In testing places for which testings on not more than seven days in each quarter have been prescribed, not more than one testing in the quarter may (but need not) be made on a Sunday. In testing places for which testings on more than seven days in each quarter have been prescribed, at least one-tenth, but not more than one-fifth, of the total number of testings shall be made on Sundays. There are instructions with regard to intervals between tests. A representative of the undertakers may attend during tests or inspection and adjustment, &c., of the apparatus.

TESTING FOR PRESSURE AND SULPHURETTED HYDROGEN.

The testing of the pressure of the gas forms the next section of

the Notification. The method of testing with the U-tube gauge is described, as well as the method of testing with the pressure register. The Referees prescribe that testings shall be made with a pressure register at all testing places for which they have prescribed a recording calorimeter. They will also prescribe it for other testing places and positions in cases in which intermittent tests with the U-tube gauge appear to them to be inadequate, or effective only if the Gas Examiner's time is given to them to an inordinate extent, or at inconvenient hours. The prescription in the case of the Aldershot Company was reproduced in full in the "JOURNAL" for Jan. 24 last, p. 195.

The apparatus to be used in all cases for testing gas to ascertain if it contains any trace of sulphuretted hydrogen is described, as well as the method of testing.

TESTING FOR CALORIFIC VALUE.

The Notification next deals with testing for calorific value. The apparatus to be used for ascertaining the calorific value of the gas supplied by undertakers who have sold in the preceding year not more than 100 million c.ft. of gas shall be the Boys non-recording calorimeter, with accessories, as described in an appendix. Other types of water-flow calorimeter which measure directly the gross calorific value of the gas, and certain other forms of accessory apparatus, when already provided by the undertakers, may in exceptional cases be sanctioned by the Referees for use in official testings in place of the apparatus described, on conditions as to the method of use and the term for which such sanction is granted which will be specified in the Special Prescription for the undertaking. Such sanctions will be granted only to avoid the cost of the immediate replacement of testing apparatus which the Referees are satisfied can be made serviceable for the time being, and will not usually be granted in the case of the larger undertakings. All new apparatus for use in official testings must be as described in the appendix.

The apparatus to be used for ascertaining the calorific value of the gas supplied by undertakers who have sold in the preceding year more than 100 million c.ft. of gas will be prescribed by the Referees in the Special Prescription for each undertaking, and will include, as soon as it is practicable, a calorimeter for the production of a continuous record of the calorific value of the gas supplied. The Referees are not, however, prepared at present to specify a recording calorimeter which they will prescribe for general use in official testings. They have arranged for trials in official gas-testing places of recording calorimeters of several types; and such trials will serve to guide them in prescribing recording calorimeters for use in official gas testings. In all testing places for undertakings which have sold more than 100 million c.ft. of gas in the preceding year, unless a recording calorimeter is specifically prescribed in the Special Prescription, the testings of calorific value shall be made by means of the apparatus prescribed for use in testing places for smaller undertakings.

All thermometers, measuring vessels, and meter-proving measures used in official testings of calorific value shall have been certified by the Referees; and the Gas Examiner shall satisfy himself before making the test that they have been so certified, and shall use them according to the instructions given. The calorimeter itself, if new, shall be sent to the Referees' office, either by the undertakers or by the makers, for certification. In all cases, specified parts and accessories of the calorimeter must be sent to the Referees' office for certification.

The method of testing with the non-recording calorimeter is set out. The general method of obtaining a continuous record of the calorific value of the gas supplied will be prescribed in a future Notification; but the Referees may in the meantime prescribe for special cases in the Special Prescription for the undertaking, as has already been done by them in regard to the Brentford Gas Company.

REPORTS, &c.

The times and forms of Gas Examiners' reports are specified. No average calorific value shall be reported for less than a quarter. The undertakers shall notify the Referees and the Gas Examiner within seven days after the end of the quarter of any reports made during the quarter in respect of which the undertakers have appealed to the Chief Gas Examiner. The procedure to be followed in appeals under section 6 of the Gas Regulation Act is set out in "Statutory Rules and Orders, 1922, No. 403; Gas Appeal Procedure," published by H.M. Stationery Office, price 1d. net. In the event of the Gas Examiner having been thus notified, he shall defer issuing his report for the quarter until the Chief Gas Examiner or the Gas Referees have informed him of the result of the hearing of the appeal. He shall then prepare and issue his report for the quarter, amending or annulling if necessary, according to the decision of the Chief Gas Examiner, the report of any testing in respect of which an appeal has been made.

The undertakers shall cause to be printed on each consumer's gas account the following statement:

> *Gas Regulation Act*, 1920.—The Gas Referees prescribe that the results of the tests made by each officially appointed Gas Examiner shall be made available to the public in the following manner: A copy of his report for the preceding quarter, as forwarded to the local authority by whom he is appointed, shall be exhibited by the undertakers in each of their gas offices and showrooms, and shall either be carried by each of their collectors for production to any consumer on demand, or, alternatively, shall be forwarded by the undertakers to any consumer at his request.*

On receipt of the Special Prescription of the Referees, the gas undertakers shall send the Referees a complete list of their gas offices and showrooms, and shall notify the Referees of any alterations or additions to the list as soon as they are made.

* The undertakers may choose either alternative, and omit from the printed notice the reference to the alternative not chosen. The exhibition of the report in gas offices and showrooms is compulsory in all cases.

ANOTHER LEAD-BATH LOW-TEMPERATURE CARBONIZATION PROCESS.

[From the "Chemical Trade Journal."]

A short time ago there was given a description of a lead-bath process for the low-temperature carbonization of coal, the invention of Mr. J. S. Morgan.* Particulars have just been published of another process in the United States, also using a lead-bath, which has been devised by Messrs. V. Z. Caracristi and Emil Piron.

The object of using a lead-bath is to improve the conduction of the heat from the heating medium to the coal, which itself is an extremely bad conductor. In connection with the Caracristi process, we understand that a plant has been constructed at Huntingdon (W. Va., U.S.A.), which is really a large-scale experimental unit, having a daily capacity of 25 tons; the research work on this plant and in the laboratory extending over the past two years. The firm of Messrs. Henry Ford are strongly interested in the process; and they intend eventually to build a very large low-temperature carbonization plant at their River Rouge establishment, Detroit, which will carbonize 4000 tons of raw coal per day. The intention is to burn the residual low-temperature fuel in the pulverized condition under huge water-tube boilers, which are at present being worked with pulverized raw coal, in conjunction with blast-furnace gas.

The Caracristi process for large-scale working consists essentially of horizontal firebrick retorts, 44 ft. to 52 ft. long, having two horizontal arch chambers 14 ft. wide and 6 ft. 5 in. in height, provided with curtain walls at each side to separate the heating and exhaust chambers from the carbonizing space. These heating and exhaust chambers are connected by cast-iron U-shaped flues in twin form, the lower section of the flues being provided with a bath of molten lead, and having combustion chambers for gaseous firing under the lead-baths, so as to keep the metal in a molten condition. Each of these chambers has a conveyor system made-up of three strands of cast-iron plates 3 ft. wide and 18 in. pitch, held together by steel hinge-pins, being 1 in. thick, with flanged ends, with the hinge joints overlapping, so that no cracks can be forced; these flat conveyors riding on the surface of the molten lead. The raw coal is roughly pulverized, and travels through the heating chamber as a thin layer ½ in. thick on the lower plates. The actual temperature of carbonization is just over 1000° Fahr., the lead being 1200° Fahr.; while an elaborate installation of bye-product recovery plant and regenerators will also be included.

It is stated that this carbonization temperature of 1000° to 1200° Fahr. is the most suitable for the plant from the point of view of efficient heat transfer. The remarkable claim is made that carbonization can actually be completed in five minutes only, so that the plant is of very high productive capacity, the failure in regard to which has hitherto been one of the chief drawbacks of any process of low-temperature carbonization. The fact that the firm of Henry Ford are associated with the enterprise is sufficient guarantee of its possibilities, although one would think that to keep very large baths or troughs of lead in a molten condition at 1200° Fahr., presumably for weeks on end, would give much trouble with molten slag on the surface of the lead due to oxidation, and perhaps also to organic lead compounds.

* See "JOURNAL," Vol. CLXII., p. 162.

A Positive Float for Oil, Tar, &c., Tanks.—Mr. F. M. Coakley, writing in a recent issue of "Power," remarks that the floats used in connection with sight-gauges on fuel oil, tar, &c., tanks, generally consist of copper or sheet-iron cans, which, being very light, do not always rise and fall with the liquid. Therefore one is in doubt as to the correct level of the supply. He illustrates a float which is heavy, and positive in its action. It is made of a piece of 6-in. wrought-iron pipe, which is filled with a piece of wood turned to the proper diameter. The ends are then made tight by using standard pipe-caps, and either welding or soldering round at the edge of the cap. The counterweight is of cast iron, with an eye tapped in, and is connected to the float with light ¼-in. flexible cable. To arrive at the weight of the counterweight, first determine the weight of the float, and then, assuming that the float is to be submerged to the centre of the pipe, the counterweight will weigh one-half the weight of the float. If friction is excessive at the sheaves, the counterweight must be heavier. Should the float be constructed and installed properly, it will be reliable in any location.

CHEMICAL TOPICS FROM CURRENT LITERATURE.

Monthly Notes from Recent Technical Publications.

By H. J. HAILSTONE, F.C.S. (Rochdale).

MOISTURE IN COAL.

An investigation bearing on the topic of coal washing has been carried out by Messrs. Drakely and Jones; and a report of their studies of the relationship between the specific gravity and the moisture content of coals has been published in the "Journal" of the Society of Chemical Industry. The matter is of interest in view of the determinations of the quality of washed coals by the simple "float and sink" test. In order to select a satisfactory standard method of preparing samples for such tests, the authors examined the various methods of drying—by desiccation over calcium chloride solution, over sulphuric acid, *in vacuo*, and in currents of air, nitrogen, and hydrogen. Methods of saturation with cold and with boiling water were also examined, both at atmospheric and at reduced pressure. The results obtained indicated that for industrial float and sink tests it would be quite satisfactory to employ washed coal samples which have been air-dried for 24 hours in a room of fairly constant humidity.

GAS ANALYSIS AND COMBUSTION CONTROL.

Mercury used in gas analysis operations invariably becomes foul after continued use; and it is then necessary to submit it to some method of purification. A new form of cleansing apparatus has been devised by Messrs. Dixon and M'Kee; and the details published in the Transactions of the Chemical Society enable this to be constructed and put into operation with very little trouble. In the process described, a current of air is drawn through the foul mercury, whereby it is finely divided and the impurities removed as a scum. With very foul material the use of dilute nitric acid is advantageous; but otherwise no reagent is found necessary.

While dealing with the subject of gas analysis, some interesting matter concerning the results of flue-gas tests seems opportune. D. Brownlie, in the "Manchester Guardian," draws attention to an important point not sufficiently realized in boiler firing for steam generation. It does not follow that the greatest fuel economy is indicated by a high CO_2 content in the flue gases. This is on account of the uneven thickness of the fuel bed, which may allow of local formation of carbon monoxide where the layer is thick, as well as carbon dioxide over the rest of the grate—*i.e.*, one section may be getting an excess of air, while another may have insufficient for proper combustion. The loss of heat units due to carbon monoxide passing away in the flue gases may be very great, and may easily nullify advantages gained by avoiding theoretical excess of air. In practice, the point to aim at is the maximum of CO_2 with no CO or unburnt products. This critical point differs with various types of furnace and coal. It is thus made clear that a high carbon dioxide record alone cannot indicate the highest practical efficiency, unless the absence of carbon monoxide is proved. Duplex automatic recorders can be obtained for recording the amounts of both of these gases simultaneously; but owing to the small amount of the monoxide usually present, it may sometimes be preferred to estimate this in a large sample collected over a long period.

BENZOLE IN GAS.

A simple apparatus, consisting of a copper cylinder having a short inlet tube at the top and an outlet tube from the bottom which is brought up in a coil round the cylinder, is described by T. Haber in "Chemiker Zeitung." Facilities are provided for charging the cylinder with the charcoal which is used to absorb the benzole from the gas under test. After a sufficient volume of gas has been passed through the apparatus, it is immersed in a bath of oil heated to about 180° C., and steam is passed in the reverse direction—*i.e.*, through the outer coil and up through the charcoal in the cylinder, finally passing out through the tube at the top to a condenser. The benzole is thereby condensed and may be measured. While still in the hot bath, a current of gas may be passed through the apparatus in order to drive off all moisture and leave the charcoal ready for another test.

NAPHTHALENE.

A discussion by B. Richardson on naphthalene and its extraction from coal gas appears in the "Journal" of the Society of Chemical Industry, and the principles underlying its deposition and removal are stated. The claim is made that the rotary washer-scrubber worked on the counter-current principle is the most efficient apparatus for the purpose. Creosote oil appears to be the best medium for extraction, anthracene oil having certain disadvantages due to a tendency to solidify. American and Mexican gas oils are used successfully and with good results; 35 to 45 gallons being required per million c.ft. of gas.

HEAT TRANSFERENCE.

In no other industry, I think, does the question of the utilization of heat enter so thoroughly into the general processes and works practices as it does in the gas industry; and at all times any information which summarizes or contributes to knowledge of the general problems of heat transference is welcome. The methods by which heat travels from point to point have been summarized by J. G. Greenfield in "Chemistry and Industry"; and particular attention is given to the effect of gaseous and liquid films. Gases are of course poor conductors; and the stationary gaseous films adjacent to brick walls or iron plates offer as much resistance to the passage of heat as does the solid wall. We meet time after time with the problem of the transference of heat from one gas to another, or to a liquid, in the gas-works routine—in raising steam, in cooling gas, on the ammonia plant, in distillation work, &c.; and in all these cases heat passes through a film of gas, through a metal or brick wall, and finally through another gaseous film before reaching the other gas or liquid to be heated. The laws underlying each stage are stated, and useful formulæ are given. With regard to radiation, which is very marked in high-temperature work, Stefans' law is quoted, and other formulæ are given, together with further references of interest in connection with this fascinating subject.

DISTILLATION UNDER REDUCED PRESSURE.

In the ordinary distillation of petroleum a large amount of cracking goes on at the higher temperatures (300° to 400° C.); and in order to prevent this as much as possible, the stills, condensers, and receivers are put under reduced pressure. The latter part of the distillation may then be conducted at much lower temperatures, with consequent reduced formation of coke and the production of better-quality products. A few particulars in this connection have been given by Messrs. Morrell and Egloff. The same principle has been employed in tar-distillation practice, though it is difficult to say to what extent it has been adopted in this country or elsewhere. Dr. Lunge makes reference to such distillation work in his "Coal Tar and Ammonia," and mentions particularly the improved quality of the distillates as well as the higher yield and quicker distillation. In dealing with naphthas and with carbolic and cresylic acid refining, it is very probable that similar advantages accrue to an even greater extent.

FLASH-POINT TEMPERATURES.

The recent researches of Dr. Ormandy and Mr. Craven throw much light on the relationship between the flash points and boiling points of volatile organic compounds. In order fully to investigate the various problems, special testing apparatus was devised for determining flash points at very low and at high temperatures, and also at low pressures and pressures up to 100 lbs. per sq. in. Working with pure organic substances, such as pentane, benzole, toluole, and naphthalene, the relation between flash point and boiling point was found to be in accordance with the following formula.

Flash point = 0·736 (boiling point + 273) − 273, where temperatures are in ° C.

The factor 0·736 holds good for hydrocarbons at atmospheric pressure, but is found to increase with a decrease of pressure and to decrease as the pressure rises.

The effect of other gases than air was studied; and oxygen caused flashing to occur at lower temperatures. The relative extinctive effects of CO_2 and N_2 in the atmosphere were found to be reversed when the oxygen was present to any extent exceeding 40 p.ct. The effect of dissolved gases in the liquids used was marked; and the flash points were considerably lowered unless special precautions were taken to remove these gases before the tests. In the work on hydrocarbons it was noticed that these had approximately the same vapour pressure (about 12 mm.) at their respective flash-point temperatures.

In referring to the two flash points usually obtainable with the special apparatus used, these correspond to the air-hydrocarbon mixture reaching the upper or lower limits of flame propagation. The constant for the higher limit averaged 0·800 instead of 0·736 as given in the formula above, which refers, of course, to the lower limit. The question of flash points is of great importance in industrial matters concerning the use of liquid or gaseous fuels in internal-combustion engines, cost of transport, the use of inflammable goods, &c.; and the points covered in this research will well repay careful study.

ROAD-TAR CONSISTENCY.

A series of experiments conducted by D. C. Broome on prepared tars obtained from horizontal-retort tars produced in Lancashire and North Wales, failed to give a definite factor of relationship between temperature and consistency, though some useful curves were derived from the results obtained. The standard method drawn up by the Ministry of Transport was adopted; this entailing the use of the Hutchinson tar-tester at 25°C. The consistency of tars is rapidly reduced as the temperature rises; and reference to the curves shows to what extent this occurs. Useful data, in graphical form, are provided regarding the effect of additions of Trinidad pitch and mexphalt; and from this it is possible to ascertain the amount of reinforcement required to bring a given tar up to a required standard of consistency. The effect of the addition of inorganic "fillers" in a fine state of division, is to raise the consistency of the tar in definite amounts; and the formulæ which have been worked-out will enable the precise effect of such additions to be quickly ascertained mathematically. The accurate determination of a tar's resistance to flow—its viscosity, or consistency—is by no means the simple operation generally imagined; and several precautions must be taken by the careful worker.

There are several disadvantages to the existing simple methods which employ some form of hydrometer; the time occupied in sinking a distance between two points being recorded as the consistency at a particular temperature. Such tests, requiring a comparatively large volume of tar in a vessel wide enough to obviate any tendency to drag, may only be employed over a limited

range of quality, as with the more viscous materials the time of sinking is unduly prolonged. The most serious disadvantage is the consequent delay in getting the sample to the exact temperature for testing. Tars are bad conductors of heat; and it therefore takes a long time accurately to adjust the temperature of a large bulk to the correct point. This adjustment is of vital importance in the test owing to the extreme susceptibility of tars to small temperature changes. Many little practical points may affect the results—for instance, whether the tar has been heated-up or cooled-down to the testing temperature, and the length of time it is maintained thereat prior to testing. In the case of a sample collected from a mixed bulk, care should be taken that the mixing is thorough, that the sample is free from air bubbles and water, and that there is no trace of a "skin" on the surface. These questions are of considerable significance in works control, where the large bulks of road-tar mixtures must be dealt with promptly during manufacture and blending; and in these cases quicker means of conducting the viscosity tests have to be devised.

ADJUSTABLE STOPS FOR GAS-TAPS.

In the "Journal" for Aug. 24, 1921, appeared a description of an invention patented by Mr. J. Pearson (of No. 2, Lugard Road, Peckham). This consists of an adjustable fitment which can be fixed to taps, valves, or cocks in order to regulate the flow of gas to the burner head. Recently an improved form of this device has been designed; and the arm which serves to carry the adjusting screw is cast on the tap itself. It is, of course, a recognized fact that in burner adjustment there is an optimum position of the tap at which the mixture of gas and air passing to the burner head is of such composition as to ensure the most efficient lighting results. If the tap is opened further than this point, gas is wasted. The idea of the regulating device, then, is to arrive at the optimum point once and for all, set the adjusting screw at this position, and, throwing cares and worries to the winds, to open the tap to the stop, secure in the knowledge that the most efficient results are obtained with the minimum of expenditure. We are informed that this improvement is of special value in factories, and that goodly savings have been effected by its installation. Its working is obviously dependent upon uniform supply pressure; but this should be assured, otherwise no lighting equipment will ever give satisfaction.

Gas-Making from Mixed Coals.

Mr. W. C. Butterworth, Manager of the Small Platteville Gas-Works, stated, in a paper read at the recent meeting of the Wisconsin Utilities Association, that in 1917 his Company were carbonizing standard gas coal. The required quantity of gas was 50 p.ct. of the bench capacity; and it was difficult to produce this small amount without destroying the bench. It was not possible to open the retorts and stand until more gas was desired; and the alternative of low heats and long period charges was adopted. The yield of gas and coke was, however, very unsatisfactory. These conditions, together with a subsequent five years' experience of mixing and testing coals, has developed the proposition that: "When the retort capacity of a coal-gas plant is greater than 80 p.ct. of the gas peak load for twenty-four hours, the retort capacity should be rated by the amount of coal that can be carbonized." The coals, or mixtures of coals, should yield the required amount of gas only, and produce the greatest quantity of good coke and other bye-products. The net revenue from coke and tar must be such that the balance of coal cost will not increase the unit cost of gas. The percentage of coke recovered for sale is the index for coal value, provided the coal will make sufficient gas to meet requirements. Comparing the results of the year 1922 with mixed coals with what would have been the case with standard gas coals, the difference is $1·741 per ton in favour of the mixed coals as used. Also comparing the production of 1922 with that of 1917 (standard gas coal), the gas increase was 8·51 p.ct., and the coke-recovered increase was 43·21 p.ct. per ton of coal carbonized. The author has observed that with mixed coals generally, when a so-called high volatile coal has given up its rich gases, the low-quality gas is improved if the distillation is timed to the peak of the slower coal. Also, near the end of distillation, the quick coal heat is given off and absorbed by the slower coal. He has further observed that the timing can be controlled by the size of the coal. Mr. Butterworth gives in his paper the figures relating to a number of coals, and puts the problem to be solved in this way: Find the proper amount and combination of these coals to produce 35,000 c.ft. of 540 B.Th.U. gas in twenty-four hours; and the same for 40,000, 45,000, 50,000, 55,000, and 60,000 c.ft. In working out this problem, one must use the cost of coals in store.

Report of the Fuel Research Board for the Years 1922-23.—This publication deals with the production of air-dried peat. The report, which has been submitted by Prof. P. Purcell, who is Peat Investigation Officer to the Board, is voluminous in character, and contains much of importance. Copies are obtainable at H.M. Stationery Office, Imperial House, Kingsway, W.C. 2. Price, 5s. net, post free.

BENZOLE RECOVERY.

A paper on the above subject was read by Mr. T. Biddulph-Smith before the Coke-Oven Managers' Association (Northern Section) at Darlington on May 26. After drawing attention to the work of Brunck, who introduced the method of scrubbing coal gas by creosote for the recovery of benzole, he mentions the work of Still, who proved that loss in scrubbing efficiency was due to (1) retaining in circulation oil of high molecular weight, and (2) the incomplete stripping of oil in the still.

Experiments by the author have shown that the raising of the average molecular weight is not due to the dissociation of the oil molecules with the precipitation of carbon, as is often accepted. When a sample of ordinary circulating oil which is "spent" is examined microscopically, a considerable amount of suspended matter is observed, which is often incorrectly considered to be carbon.

The Suspended Matter in "Spent" Wash Oil.

The suspended matter was easily filtered; and after repeated extraction with benzole, to remove the oil, 4·5 grammes of black residue were obtained from 250 grammes of oil. On extraction, first with water then with dilute hydrochloric acid, the residue was reduced to 0·18 gramme, and was found to consist mainly of carbon, together with traces of ferrous sulphide. Analysis of the extracted salts showed them to consist of sodium and ferric chlorides, traces of their respective sulphates, and ammonium chloride. Cyanides, thiocyanates, and ferrocyanides were found to be present only in minute traces. The microscopical examination of the oil also showed plainly that the suspended particles were surrounded by globules of water which, compensating for their higher sp. gr., left them in suspension. The vapour pressure of a liquid is diminished proportionally to the molecular amount of substance in solution—*e.g.*, a 41·2 p.ct. solution of sodium chloride boils at 108·4° C., and when it is appreciated that with a "salty oil" the contained water will be a saturated solution, it is obvious that in most plants the boiling point of that solution will not be reached in the superheaters; and even if the oil leaves the still at 108° C., the water content will be increasing instead of decreasing.

The Effect of Water in Wash Oil.

The effect of the presence of water on the absorption power of wash oil has been a battle-ground of conflicting opinions for a considerable time. On experiment the author has found that the percentage covering-power of the oil is lowered by 7·50 p.ct. on the addition to dry oil of 5 p.ct. of water. Therefore one would expect a lowering of efficiency when water is present. In the author's opinion, the good results obtained in such circumstances are due to the fact that benzole and its homologues are easily distilled in steam, and therefore a large portion of them leaves the oil together with the great quantities of steam liberated in the heater, thus giving the oil a preliminary steam distillation before entering the still, and consequently ensuring a better stripping.

Methods for Eliminating Water and Suspended Matter.

Two possible methods may be suggested: (1) By filtering the oil in a filter press, or by pumping through bags made of filter cloth; (2) by means of driers, of which there are a number on the market and the makers of which guarantee to remove 99·9 p.ct. of the moisture, and all solid matter, from the gases treated.

A New Crude Benzole Standard Needed.

The ideal method would be to start with a wash oil boiling at 200° C., and having a yield of 80 to 90 p.ct. at 300° C. After enriching, this should be completely stripped in an efficient plant; no regard being taken as to the strength of the benzole. The distillate should then be redistilled in a "crude" pot still to 200° C., and the residue, after extracting the naphthalene, should be returned to the oil circulation. By this means, crude benzole 100 p.ct. at 200° C. would be made, and the wash oil would maintain for a considerably longer period its molecular weight and also, providing that the suspended matter is removed, its absorbing efficiency. The main drawback appears to be that buyers of the crude benzole are in most cases the manufacturers of wash oil, and will not readily give up the advantages which they obtain through the standard being 65 p.ct. at 120° C.—to the loss of the crude benzole manufacturers. It is therefore suggested that the National Benzole Association have a golden opportunity further to justify their existence by taking the lead, and insisting that the old standard be replaced by a more scientific and fairer one—*e.g.*, 100 p.ct. at 200° C.

Joint Gas Salesmen's Circle Conference at Harrogate.—A joint conference has been arranged, in the "Y.M.C.A." room at Harrogate, for Friday afternoon, July 13, between the British Commercial Gas Salesmen's Circle (Manchester District and West Riding of Yorkshire Section) and the Association of Gas Salesmen (Northern Area). Mr. S. H. Packer (the Chairman of the West Riding Salesmen's Circle) will preside; and after his opening remarks, there will be an address by Mr. A. B. Roxburgh (Chairman of the Gas Salesmen's Association, Northern Area), on "Meeting the Consumer's Needs," and a paper by Mr. W. H. Cooper, entitled "Co-operation by Gas Undertakings."

ALKALI WORKS CHIEF INSPECTOR'S REPORT.

In his report to the Minister of Health for the year 1922, Dr. T. Lewis Bailey, Chief Inspector under the Alkali, &c., Works Regulation Act, 1906, states that the total number of works registered was 1240, which entailed the inspection of 2005 separate processes. Compared with the previous year, this is a reduction of 43 in the number of works, and of 64 in the number of processes. Though normal trade conditions have not yet been re-established, he sees in the introduction of new methods of manufacture a hopeful sign for the future of the country, as well as a state of affairs which calls for increased vigilance on the part of the inspectors. Again, several works have been found carrying on operations without previous registration (the number including two tar distillation works); and he remarks upon the strangeness of the fact that even yet it should be necessary to call the attention of chemical manufacturers to the penalties prescribed for such contravention of the Act. The total number of inspections of registered works made during the year was 3837; and it has been found that, on the whole, operations have been conducted satisfactorily. It is mentioned that, unfortunately, the employment of gas firing in connection with salt-cake furnaces has shown no progress as yet.

SULPHURIC ACID WORKS.

With regard to sulphuric acid works, Dr. Bailey remarks that electrostatic deposition of dust from burner gas is receiving more attention, but that each case should receive special consideration according to the nature of the material to be deposited—*e.g.*, volatility of constituents and conductivity affect the question of how decomposition is best to be effected electrically. Leakage of sulphur dioxide at the point of entry of the burner pipe into the Glover tower is frequently a cause of annoyance; and in this connection it is noted that a water-jacketed collar, burnt on to the side of the tower, has with great advantage been used for some time at one works.

With regard to contact processes, there has been some improvement in the working of Grillo plants; but more is needed. At the outset, dust, and subsequently acid mist, are essentially to be guarded against, if conversion efficiency is to be maintained. In each case, electrostatic deposition can play a very important part in attaining the end desired. Indeed, in one works during the year, such means have been introduced with apparently excellent effect. At one installation, exit gases are to be scrubbed with a solution of sodium carbonate, with the resulting production of bisulphite. He says, however, that it should not be necessary to have recourse to any such means of recovery simply for the purpose of bringing the acidity of the exit gases within reasonable limits.

SULPHATE OF AMMONIA AND GAS LIQUOR WORKS.

In the section relating to sulphate of ammonia and gas liquor works, Dr. Bailey draws attention to the fact that the outstanding feature at present is the general tendency towards the production of neutral sulphate. This, he points out, is usually effected by neutralizing the fished acid salt, and then drying; but an interesting departure from this method is the "Bedford" process, in which a primary and a secondary saturator are employed; the liquor in the main (primary) saturator being taken to neutrality, so that the salt as fished is already neutral, and requires drying only. Readers may be reminded that the "Bedford" process formed the subject of a paper read by Mr. J. B. Hansford at a meeting of the Eastern Counties Gas Managers' Association (see "JOURNAL" for Sept. 28, 1921, p. 721).

Dr. Bailey's subsequent remarks under the same heading are reproduced: It is not edifying in these days of scientific control to reflect on the somewhat haphazard methods prevailing in so many sulphate of ammonia works. Bye-products ought surely to be manufactured under as economical conditions as possible, compatible with quality of the article produced. The whole process of the treatment of ammoniacal liquor seems to be worthy of more attention at the hands of manufacturers than it receives; but two points in particular are worthy of special consideration—first, on the ground of economy, and, secondly, by reason of the present-day difficulty, so frequently experienced, of getting rid of spent liquors. I refer here to the quantities of lime and steam used in the still. The one is a case of the amount of alkali actually required to bring about the setting-free of the "fixed" ammonia; the other is a question of the heat units required in the distillation process. It is a fact that these two items show very great variations; and both are frequently in far greater excess than there is any need for. These points are considered in some detail in a portion of the report dealing with effluent spent liquors.

TAR-WORKS.

The most recent innovation in tar distillation, Dr. Bailey states, is the use of a molten metallic alloy for heat transference in the still. In each section of the plant, the tar is fed in below the surface of a molten lead alloy, maintained at the desired temperature. Successful development of this variation from the usual plan of direct heating of the tar, may have quite a number of advantages, including prevention of the separation of carbon. Practically the only cause of complaint during the year has been want of attention to pitch coolers at some works. Fume pipes from pitch coolers are frequently neglected. There is no difficulty in providing, and maintaining in good order, a pipe from the top of the pitch cooler to ground level, which is lightly sealed in oil, or even water. Other methods also are in use. Where serious corrosion of the still is experienced, owing to the presence of tarry emulsions of an acid character, it is possible that considerable advantage may be obtained by the use of aluminium oleate, which may be prepared from oleic acid and such an aluminous material as alumino-ferric. At one works this has been used with considerable success.

Ammonia Products Manufactured in England and Wales (expressed as Sulphate, 25¾ p.ct. NH_3)—Tons.

From Liquor Produced in—	1922.	1921.	1920.
Gas-works	144,817	129,431	143,979
Iron-works	83	167	718
Shale-works	—	—	—
Coke-oven works	125,679	54,184	143,391
Producer-gas and carbonizing works (bone and coal)	4,722	4,446	10,005
Total.	275,301	188,228	298,093

NOTE.—Of the total quantity of ammonia products, the equivalent of 29,456 tons was manufactured as concentrated ammoniacal liquor; the balance of 245,845 tons consisting of other ammonia products (sulphate, chloride, nitrate, &c.).

Tar Products Manufactured in the United Kingdom, 1921.

—	Gas and Coke Oven Works.	Other Works.
	Tons.	Tons.
Tar distilled	1,176,610	9,384
Pitch produced	448,595	4,288

TREATMENT OF EFFLUENT SPENT LIQUORS FROM THE DISTILLATION OF AMMONIACAL LIQUORS.

This lengthy section of the report (in continuation of information on the same subject given last year) is reproduced in full in succeeding pages of the "JOURNAL."

In conclusion, acknowledgment is made by Dr. Bailey of the way in which his colleagues individually have attacked the various problems which have come under their notice; and he thanks Mr. Linder for his ever-ready help in all circumstances.

Report for Scotland.

In the report which he has presented to the Scottish Board of Health, Mr J. W. Young states that, generally speaking, operations in the year under review continued to be restricted; but in the later months there was, in some branches, increased activity. The number of works registered was 165, in which 315 scheduled processes were carried on—including 14 gas liquor, 111 sulphate and muriate of ammonia, and 58 tar plants. There were 511 visits made to these works.

Ammonia Products, Tar Distilled, and Pitch Produced.

—		1922.	1921.
		Tons.	Tons.
Salts of ammonia (expressed as pure sulphate)—			
From gas-works	19,046		
,, iron-works	2,996		
,, shale-works	45,860		
,, coke, producer-gas, and carbonizing works	7,939		
		75,841	62,343
Tar distilled—			
At gas-works and coke-ovens	138,385		
,, other works	34,786		
		173,171	148,608
Pitch produced—			
At gas-works and coke-ovens	41,978		
,, other works	19,375		
		61,353	58,833

Referring to sulphuric acid works, Mr. Young remarks that spent oxide has been burned in greater quantity. Inadequate retention of dust has led to frequent trouble. Unavoidable diminution of chimney draught caused a short period of disorganization at one works, so that his test of the exit gases from the plant slightly exceeded the statutory limit of 4 grains of acidity. A variation from the usual method of scrubbing residual gases of the lead-chamber process has been on trial; and later it is hoped to present a full account.

With regard to tar plants, several coils have been choked in continuous dehydrators of a well-known type, owing to careless regulation of the feed.

SULPHATE AND MURIATE OF AMMONIA AND GAS LIQUOR WORKS.

At some works it was thought advantageous to run gas liquor to waste, rather than to recover the contained ammonia. Drying of neutralized salt, says Mr. Young, tends to be over-elaborated, and at too high a temperature, so that afterwards it is necessary to crush down or grind the lumps. None is so effective as the simpler plants, wherein an ample and steady current of warm air is led through the agitated salt. It is seldom necessary now to comment on oxide purifiers as being kept too long in use.

At the coke-ovens of the Plean Colliery Company, near Stirling, fluorine is found as a regular constituent in the gas liquor. By reason of its corrosive properties on metal, it is thought advantageous to remove it before recovering the dissolved ammonia. He is not aware that such presence of fluorine has been previously observed.

The report—the fifty-ninth of the series—is published by H.M. Stationery Office, Imperial House, Kingsway, W.C., and Branches, at the price of 1s. 6d. net.

TREATMENT OF EFFLUENT SPENT LIQUORS FROM THE DISTILLATION OF AMMONIACAL LIQUORS.

[From the Report for 1922 of Dr. T. Lewis Bailey, Chief Inspector under the Alkali Works Regulation Act, in continuation of the information given in the Report for 1921—see "Journal," July 19, 1922, p. 150.]

THE difficulty of disposing of effluent spent liquors from the ammonia distillation process as carried on at gas-works and coke-oven works was fully discussed in last year's report. Further work has been done on the subject during the past year; but the research is still in progress, owing to the delay in erection of plant at works where novel features have been introduced that were lacking in the experimental scrubbers erected at the Hornsey Gas-Works, described in last year's report. Since their erection in February, 1921, the decolorizing and dephenolating scrubbers at Hornsey have successfully dealt with the whole of the effluent liquors produced in the manufacture of 2½ to 3 tons of sulphate of ammonia per 24 hours; and further improvement has now been effected in the character of the final effluent discharged—analysis indicating a volatilization of 71 p.ct. of the phenols, with a reduction in the figure for "oxygen absorbed"* of 42 p.ct. Undoubtedly, however, the percentage purification effected cannot be regarded as fully coming up to expectations, in view of the results obtained in the laboratory with apparatus of similar design.

The improvement in the character of the liquor, *quâ* reduction in the figure for oxygen absorbed, effected by blowing with boiler-fire gases, appears to be due in great part, if not entirely, to the volatilization of the phenols. Thiocyanate and thiosulphate must be regarded as stable under scrubber conditions; and any reduction in the figures shown by analysis is attributed to sampling and to errors inherent in the estimation of these constituents in complex mixtures. All attempts hitherto made to effect the removal of these bodies by chemical action have failed, as the value of the recovered products is negligible. Attempts to deal with the effluent liquor from the ammonia distillation plant by bacterial action on specially prepared filter beds, have met with a greater measure of success, and encourage the belief that, could the beds be fed with an effluent from which the bulk of the "phenols" had been removed by preliminary treatment in a scrubber of approved design, the final effluent discharged from the filters would be relatively innocuous in respect of phenol, thiocyanate, and other oxidizable constituents.

The matter was fully discussed in all its aspects with the manager of one of the gas-works in the London area, where the local authorities have raised objections to the character of the effluent liquors hitherto run into the sewers; and arrangements are now being made at the Hornsey Gas-Works to submit a portion of the effluent from the ammonia distillation plant to double treatment on the lines indicated above, whereby the effluent liquor from the dephenolating scrubbers will be discharged on to a filter bed charged with specially activated material, for treatment by bacterial action prior to discharge from the works. Facilities are promised for sampling the treated liquor at various stages in the process; and the results of the analyses should afford data of value for those who may be faced with similar problems.

Volume and Character of Effluent Spent Liquors to be Treated.—A preliminary discussion of this subject will be found in the report for 1921, where it is shown that the amount of thiocyanate in the liquor is in large measure controlled by the oxidizing influences to which it has been exposed prior to distillation. It is not the practice at gas-works or coke-oven works to measure the volume of effluent liquor discharged from the plant; but the volume of any given effluent may be taken as related, within certain limits, to that of the ammoniacal liquor distilled, and can be calculated with some approximation to accuracy if the ammoniacal content of the feed liquor be known; allowance being made for increase of volume due to addition of lime water and admission of steam at the still. Further correction would be necessary for water introduced with acid into the saturator, and evaporated therefrom, and for "devil" liquor condensed. Water vapour will also be present in the foul gases leaving the condensing system; but, with this at air temperature, the amount will be negligible.

* NOTE.—In the table of analyses given in the report for 1921, the figures for "oxygen absorbed" (4 hours at 27° C.)—viz., 281·5 and 219·5—are parts per 100,000 of liquor.

It has been usual to assume that the final effluent is related to the ammoniacal feed liquor as 150 : 100. The subject finds illustration in the valuable paper on the "Design and Working of Ammoniacal Liquor Stills," read by Percy Parrish before the Chemical Engineering Group of the Society of Chemical Industry at the annual meeting of the Society at Glasgow in July, 1922.* Parrish found in his experimental plant that 1277 lbs. of effluent liquor were discharged for 836 lbs. of ammoniacal feed liquor entering the still, which corresponds to a volume ratio of approximately 153 : 100. Proceeding on the assumption that the volume of feed liquor increases by 50 p.ct. prior to discharge, it is of interest to calculate from data supplied by Parrish the volume of effluent spent liquor for various strengths of feed liquor. Results are stated per ton of sulphate (25 p.ct. NH_3) to correspond with average working conditions observed in practice, and are shown in the following table.

Volume of Effluent Spent Liquor in relation to Volume of Feed Liquor.

Strength of Gas Liquor.		Gallons of Liquor per Ton of Ammonium Sulphate, based on 100 P.Ct. Conversion. NH_3 Content of S/A—25 P.Ct.	
Oz. Strength.	P.Ct. NH_3.	Gas Liquor Used.	Total Effluent Spent Liquor Calculated for 50 P.Ct. Increase on G/L.
4	0·868	6470	9710
5	1·085	5170	7760
6	1·302	4320	6480
7	1·519	3690	5540
8	1·730	3230	4850
9	1·953	2870	4310
10	2·170	2580	3870
11	2·389	2340	3510
12	2·604	2150	3230

These figures are consistent with those given by Dr. Maclean Wilson for average coke-oven practice (see Annual Report, 1921, p. 10) where 20,000 gallons of effluent spent liquor are stated to be discharged from works carbonizing 200 tons of dry coal per day, corresponding to about 9000 gallons per ton of ammonium sulphate made.

Of this:

—	Average.	Per 100 Vols. of Total Effluent.
Water of combustion accounts for	9	= 65 (liquor distilled).
Moisture in the coal	23	
Water used on the scrubbers accounts for	33	
Water condensed from steam used	17	= 35 (added in still).
Lime water feed	18	
	100	

Whence:

Vol. of Final Effluent : Vol. of Feed : : 100 : 65 (= 154 : 100).

A correct knowledge of the volume of spent liquor produced is obviously of prime importance in any case where treatment of the effluent by blowing with fire gases is under consideration. Measurement of the feed and effluent liquors would undoubtedly be the best way to obtain the necessary data. The collection and measurement of a large volume of boiling liquor highly charged with suspended matter, however, would require the provision of plant not always available; and the use of an alternative and simpler method is to be desired. Mention was made in last year's report of a method of calculation based on an analysis of the inlet and exit liquors concerned, taking the amount of chloride entering and leaving the system as a constant, to which volumes are related by simple arithmetical calculation. Unfortunately, the amount of chloride present in many liquors is small; and its estimation in complex mixtures, highly charged with organic matter, is an operation by no means easy to effect. It was thought desirable, however, to apply the method in a concrete case; and, with this end in view, arrangements were made at one of the larger coke-oven works to submit the procedure to rigorous test under controlled conditions.

The plant employed for the experiments included a Holmes rectangular still, with heater and bottom discharge saturator, erected in 1911. The foul gases, after cooling to air temperature, are burnt in the oven flues. Three tests were made. In the first two experiments the spent and "devil" liquors were mixed in a large tank, and the effluent sampled on its way to the spoil tip. In the third experiment the effluent from the still and the "devil" liquor were kept separate, and the amount of "devil" liquor was measured. The ammoniacal feed liquor in all three experiments was measured in a large boiler, and the lime feed in a drum.

In Test No. 1 equal volumes of feed and effluent liquor were collected every fifteen minutes, to obtain the necessary bulk samples over the whole period of testing; but the precautions

* See "JOURNAL," Vol. CLIX., p. 89.

necessary to guard against oxidation of the feed liquor were omitted; and the results of the analysis in this case afford no data for a comparison of the weights of thiocyanate and thiosulphate entering and leaving the system. In the second test the sampling was properly carried out; but the boiler in which the effluent liquors were mixed contained lime deposited from previous operations, and there is reason to believe that lime passed into solution, and caused the fixed alkalinity figure of the final effluent to exceed its proper value. In Test No. 3 conditions *quâ* sampling and the collection and measurement of liquors are considered trustworthy. The chloride figures in all three tests should be free from error; but, as already stated, volume data based on such analyses are necessarily given with reserve.

The results of the various tests are presented in Table I. In Test No. 2 general confirmation of the correctness of the volume data is afforded by the calculated weights of thiocyanate and thiosulphate entering and leaving the system, and in Test No. 3 by the figures for phenol. But the volume relationship 113 (total effluent) : 100 (feed liquor) for Test No. 2 is admittedly anomalous; and in Tests Nos. 1 and 3, the relationship 133 (or 134) : 100 is somewhat lower than the figure one was led to expect. Judgment is suspended, therefore, in the absence of further data obtained at a works where the volume data calculated from the analysis figures could be checked by actual measurement of the spent liquor leaving the system.

Lime Feed to Still.—Speaking generally, the lime feed to an ammonia still should be related strictly to the fixed ammonia content of the liquor distilled; a due excess of lime being provided to ensure the liberation of the whole of the fixed ammonia prior to discharge of the spent liquor from the still. At the best works, periodic analyses are made of the liquor distilled and of the lime used, and due adjustment is effected to ensure an excess of 10 to 20 p.ct. (Parrish). At many works, however, such analyses occupy no place in routine testing. In general, an undue excess of lime is used, which must of necessity adversely affect the production costs, and lead to increased labour charges for the cleaning of stills and the removal of sludge from spent liquor settling tanks (Works B below). On the other hand, deficiency of lime—as already indicated in the report for 1918—is often the cause of very serious loss of ammonia (Works D below). The divergency of practice from theory in this respect finds illustration in the following statement, the data for compiling which have been kindly supplied for publication by the management of three typical works, in all of which the process is under the care of a skilled chemist.

In Table I. no correction is applied to the figures for steam used due to water entering with the acid and evaporated from the saturator, nor for moisture in the foul gases leaving the condenser. The net effect would be to diminish the figure for water equivalent to steam used by about 50 gallons per ton of sulphate of ammonia made.

Lime Feed in Relation to Fixed Ammonia.

Gas-Works Liquor.	Works A.	Works B.	Works C.	Works D.	
	Lime Feed.			Soda Ash Feed.	Equivalent Lime Feed.
Period	6 months	6 months	One week	Two weeks	
Ammoniacal liquor distilled: Volume . . . galls.	24,189,000	2,736,000	42,770	29,660	
Fixed ammonia: P.Ct. of total ammonia	23·5	21·0	16·3	23·3	
Total weight . . .	441	34	16·2 (cwts.)	23·6 (cwts.)	
				As Na_2CO_3	As CaO.
Lime, as CaO: Equiv. to fixed NH_3 tons	726	56	26·7 cwts.	73·5 cwts.	38·8 cwts.
Actually used . tons	804	162	28·0 ,,	93·0 ,,	49·1 ,,
Excess used . . tons	78	10·6	1·3 ,,	19·5 ,,	10·3 ,,
Excess used . . p.ct.	10·7	19 0	4 8	26·5	26·5
Used, per 1000 galls. of liquor distilled cwt.	0·67	1·18	0·65	3·15	1·65
Ammonia in effluent liquor . . . p.ct.	0·02	0·05	0·02	Average, 0·08 (max., 0·387; min., 0·014).	

NOTE.—The results for Works A and B correspond to ordinary working practice; those for Works C and D to special experimental periods, during which the lime (or soda ash) feed would be under closer supervision.

TABLE I. [See also Table II. overleaf.]

Relation of Feed Liquor to Effluent Liquor in Ammonia Distillation Plant at a Coke Oven Works.

	Test 1.—May, 1922.				Test 2.—July, 1922.				Test 3.—October, 1922.			
	Per 100 Parts of Liquor.		Lbs.		Per 100 Parts of Liquor.		Lbs.		Per 100 Parts of Liquor.		Lbs.	
Duration of test	2 hours				3 hours				3½ hours			
Ammonia liquor distilled—	3370 gallons				3915 gallons				4518 gallons			
Cyanide, calculated as HCy	0·007		2·3		0·033		12·7		0·012		5·4	
Sulphide, ,, ,, H_2S	..		..		0·288		112·8		0·280		126·5	
Thiosulphate, ,, ,, Sulphur (Iodine test)	0·078		26·3		0·035		13·7		0·067		30·3	
Thiocyanate ,, CNS	0·0915		30·8		0·037		14·5		0·059		26·6	
Phenol ,, C_6H_5OH	..		..		0·176		69·0		0·150		67·8	
	As NH_3.	As S/A.	As NH_3.	As S/A.	As NH_3.	As S/A.	As NH_3.	As S/A.	As NH_3.	As S/A.	As NH_3.	As S/A.
Ammonia— Free	0·825	3·20	278·0	1078·7	0·757	2·94	296·4	1150·0	0·815	3·17	368·2	1432·1
Fixed	0·170	0·66	57·3	222·3	0·091	0·35	35·7	138·5	0·105	0·64	74·5	289·2
Total	0·995	3·86	335·3	1301·1	0·848	3·29	332·1	1288·5	0·920	3·81	442·7	1721·3
Chloride, calculated as HCl	0·282		95·03		0·1535		60·100		0·233		105·27	
Lime water used (gallons)	140				190				364			
Chloride, calculated as HCl	0·0087		0·12		0·0087		0·165		0·0085		0·31	
Total chloride entering			95·15				60·265				105·58	
Effluent spent liquor (includes d/liquor)—	4490 gallons				4415 gallons				6053 gallons			
Cyanide, calculated as HCy	*Nil*		*Nil*		..		..		0·0012		0·75	
Sulphide ,, H_2S	*Nil*		*Nil*		*Nil*		*Nil*		Trace		..	
Thiosulphate ,, Sulphur (Iodine test)	0·031		13·9		0·030		13·2		0·032		19·5	
Thiocyanate ,, CNS	0·0485		21·8		0·0363		16·0		0·034		20·5	
Phenol ,, C_6H_5OH	..		..		0·139		61·5		0·1095		66·3	
	As NH_3.	As S/A.	As NH_3.	As S/A.	As NH_3.	As S/A.	As NH_3.	As S/A.	As NH_3.	As S/A.	As NH_3.	As S/A.
Ammonia . . . . Total	0·050	0·194	22·45	87·1	0·033	0·128	14·5	56·5	0·027	0·105	16·3	63·5
Fixed alkalinity, calculated as CaO	0·010		4·5		0·145		64·0		0·600		36·5	
Chloride ,, HCl	0·212		95·15		0·1365		60·265		0·1745		105·58	
	Results Calculated. For 2 Hours Test.		Per Ton S/A Made.		Results Calculated. For 3 Hours Test.		Per Ton S/A Made.		Results Calculated. For 3½ Hours Test.		Per Ton S/A Made.	
Volume of total effluent (gallons)—												
Inlet liquor fed to still	3370		6230		3915		7120		4518		6120	
Lime water added	140		260		190		345		364		495	
Entering saturator with acid	26		50		27		50		37		50	
Steam used (by difference)	954		1760		283		515		1134		1535	
	4490		8300		4415		8030		6053		8200	
Volume of effluent (inlet feed = 100)	133				113				134			
Steam used—p.ct. of inlet feed liquor	28				7				25			
Ammonia—loss in effluent, p.ct. of total entering	6·7				4·4				3·7			

Table II.—*Relation of Feed Liquor to Effluent Liquor in Ammonia Distillation Plant.*

—	Test 3.—Oct., 1922. Per Ton of Sulphate of Ammonia (25·75 P.Ct. NH_3) made.				
	Feed Liquor Entering Still.	Lime Water Used.	Effluent Liquor Leaving Still (Settled).	"Devil" Liquor Condensed.	Final Effluent after Mixing Calculated (Settled).
Volume . . . . gallons	6120	495	7190	1010	8200
Composition, weight in lbs.—					
Cyanide, calculated as HCy	7·3	..	*Nil*	1·0	1·0
Sulphide, calculated as H_2S	171·5	..	*Nil*	Trace	..
Thiosulphate (iodine test), calculated as sulphur .	41·2	..	26·5	..	26·5
Thiocyanate, calculated as CNS	36·0	..	27·8	..	27·8
Phenol C_6H_5OH	92·0	..	66·4	23 3	89·7
Ammonia (in terms of S/A)—					
Free	19·36		67·0	19·0	86·0
Fixed	3·90				
Total	23·26		67·0	19·0	86·0
Chloride, calculated as HCl .	142·5	0·5	143·0	*Nil*	143·0

—	Results Calculated.			
	Per Ton of S/A Made. Gallons.		P.Ct. of Total Volume.	
Volume of total effluent—				
Inlet liquor fed to still		6120		74·7
Lime water added		495		6·0
Entering saturator with acid.		50		0·6
Steam used—				
Condensed in still	575		7·0	
Condensed as "devil" liquor .	960		11·7	
		1535		18·7
		8200		100 0

Prospecting for Oil and Gas.

It appears from a recently issued bulletin on "Prospecting for Oil and Gas," issued by the Bureau of Mines, that there is on an average about $30,000,000 spent annually in the United States in the drilling of "dry holes" by persons searching for oil. Mr. Collom, the writer of the report, says that oil or gas has been found in 23 States, and in Alaska. Sandstone is the most usual reservoir for oil and gas in the States of New York, Ohio, Pennsylvania, and West Virginia, and is common in many other States. The productive sandstone strata have been given distinctive names, many of which are firmly established over areas of thousands of square miles. Oil fields in Louisiana, Texas, and California furnish examples of such reservoirs. In prospecting for oil, the theory that gas comes from oil is not reliable without corroborating evidence. Fields yielding no oil produce gas in large volume. The Monroe gas field of Louisiana, the largest gas field in the United States, has produced no oil, though the gasoline content of the gas is 100 gallons to 1,000,000 c.ft. In other fields gas is found in a reservoir separate from the oil. Frequently, as in parts of the Midway Field, in California, the gas occurs at different stratigraphic depths over a given area, and efforts to correlate these gas sands in well cross-sections are fruitless. Again, a sand may yield oil and gas in one part of a field, and give gas only in another part. Marsh gas is not associated with petroliferous deposits, but is found most often in areas where masses of vegetation have been buried under sediments, in streams, lakes, or marshes, and have decayed with air excluded. As marsh gas (which burns as freely as natural gas) has no relation to accumulations of oil, it does not indicate the existence of petroleum at equal or greater depths. The regional intimacy between known coal deposits and oil and gas pools in the United States may be superficially explained as a coincidence of geologic segregation. Coal can occur together with oil or gas—especially the latter—only under certain limited conditions in sedimentary rocks.

Patents in the Irish Free State.—It is announced that the Imperial Government is in communication with the Irish Free State Government as to the course to be adopted by the latter in relation to the granting of patents. The position of licensees under patents granted with validity throughout the United Kingdom, has not been affected by the setting-up of the Free State Government.

The Institution Articles of Association.—The resolution with reference to the proposed amendment of Article 40 of the Articles of Association (relating to the mode of election of officers and members of the Council), which was adopted at the Belfast meeting of the Institution of Gas Engineers, will be submitted for confirmation at a special meeting of the Institution to be held this (Wednesday) morning at No. 30, Grosvenor Gardens, S.W.

Centrifugal Precipitation of Dust from Blast Gases.

The report of the Committee on "The Elimination of Dust from Water-Gas Blast Gases," presented at the last meeting of the Empire Gas and Electric Association, stated that the precipitation of this dust by centrifugal action seems to be the method which has been by far most generally used. The experience is quoted of one plant in the Middle West, where conical-shaped arresters were installed on a number of the water-gas machines, with very satisfactory results. On the operating floor there is a container for the storage of the breeze, which is emptied at regular intervals; and in this way definite data as to the quantity of breeze collected is obtainable. The breeze collectors were installed on twelve gas-generator sets at one station, ranging in size from 8 ft. 6 in. to 12 ft. in diameter. The testing of the apparatus as to its efficiency was done by several men spreading wet paper on the ground in the territory adjacent to the works, and carefully observing for a number of hours to see if any particles of breeze were deposited. At the same time, careful data were kept of the amount of breeze taken from the containers every twenty-four hours; and this ranged from 235 to 250 lbs. per machine. At this rate, and with seven or eight machines running, they had been sending out into the surrounding neighbourhood approximately a ton of breeze every twenty-four hours. An added feature in the use of these collectors was that a material improvement was noted in the condition of the plant. The tests were taken under a low blast pressure, averaging approximately 18 in. at the generator. No doubt with the more modern sets running at a blast pressure of from 30 to 50 in., the amount of breeze removed will exceed the figures given above.

Gas for the Manufacture of Dry Colour.

Writing in the "People's Gas Club News," of the United States, Mr. Guy F. Wetzel describes the use of gas in connection with the manufacture of dry colour—*i.e.*, a powdered pigment used as the colour basis for printers' ink, calcimine, oil paint, water paint, stains, and enamels. By experiment, he says, it has been found that when certain chemicals, some of which are bye-products from coke-ovens, are put in solution, an entirely new substance precipitates out of the mixture and forms in the bottom of the tank—such as mud does when dirty water is allowed to stand still. The mud thus collected is the dry colour. The liquids are drained off after the precipitation has ceased, and the mud is put into filter presses, which simply squeeze out any water and form the colour into cakes. These cakes are placed on wire-bottom trays, thirty-five of which are put on a roller truck. Twenty-four trucks are placed in a dryer for a period of from twelve to eighteen hours. The temperature in the dryer is maintained thermostatically within one-half a degree either way of 140° Fahr. After the drying process, the cakes are removed and easily pulverized in mills suitable for the manufacture of ink, paint, and so forth. The dryers are supplied with 2000 c.ft. of air at 140° Fahr. every hour from two gas-fired air-heaters. The fumes from the gas are mixed with the air heated and delivered to the dryer. Nearly all dry colours have an affinity for sulphur resulting in absolute ruin. Accordingly, colour manufacturers exert great pains in keeping sulphur fumes away from their processes. It is interesting to note that one manufacturer allows nearly a quarter-of-a-million cubic feet of gas to come in contact with his colour process every month, without ever noticing any ill-effects or traces of sulphur. This is proof of the high efficiency of the gas-scrubbers and entire purifying plant.

Yorkshire Junior Gas Association.—The final meeting of the Association for this session will take place next Saturday (July 14), when, at the invitation of Mr. H. E. Bloor, B.Sc., B.Eng. (Engineer, Secretary, and Manager of the York Gas Company), members will visit the showrooms and works of the Company.

Income-Tax.—In order to elucidate the unpopular and harassing problem of income-tax, Messrs. Oliver and Boyd have prepared a publication designed to clear the haze in which all—experienced and inexperienced alike—find themselves when confronted with a stack of unintelligible forms. The matter is well presented, and is ready to hand for instant reference. All the various heads of abatement are tabulated with their conditions and money value, and the particulars cover all the points up to date, including this year's Budget. Copies may be had from Messrs. Oliver and Boyd, 33, Paternoster Row, E.C. (Price 1s. net; by post, 1s. 1d.)

Compressed Air for Cleaning Burners.—A "wrinkle" for cleaning burners by means of compressed air supplied from a portable tank has been sent by Mr. W. T. Watters, Superintendent of the Consumers' Gas Company at Miami (Okla.), to the "Gas Age-Record." The device was designed and built by him in his own shops for the purpose of cleaning all types of appliances, without the labour of taking them to pieces. The air tank, which can be carried by one man, in the same manner as a suit case, is made of a piece of 8-in. pipe with welded ends. There is a $\frac{3}{8}$-in. pipe, with valve welded in one end, to which is attached a hose with a nozzle tapered down to $\frac{1}{4}$ in. On the top is an automobile tyre valve, through which air is forced into the tank. At the other end, on the top of the tank, there is an air-gauge to register the pressure. Legs and handle are also welded on, making a compact outfit. The tank can be filled up to 170 lbs. pressure; and with one charging at this pressure, service men have been able to make five calls, and clean-out burners and air-mixers.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

The Ninth Report of the Gas Investigation Committee.

SIR,—In the ninth report ("Aeration and Gas Injection") of the Research Sub-Committee of the Gas Investigation Committee of the Institution of Gas Engineers, reference is made in the chapter "The Work of Others" to a formula mentioned by me in an article on "The Town Gas of the Future" ("GAS JOURNAL," CXLVI., p. 489), according to which the specific gravity of the gas was one of the factors determining or influencing the air-gas ratio; and it is pointed out that this formula is not consistent with the findings of the Committee. It might therefore be useful to state the source of my information, more particularly as this has not been referred to in the Committee's discussion on the literature. It is a dissertation on "The Bunsen Burner as Gas Injector," by Henry Pfotenhauer, recording investigations carried out in 1911-12, as Chief of the experimental workshop of the "Auer Gesellschaft," Berlin. This work was published in "Wasser und Gas," 1912-13, III., pp. 467, 496, 516, 543; IV., p. 14. It contains many data and calculations, which should be of considerable interest to the Research Committee. The author is very definite on the influence of specific gravity of air and gas, provided variations are not compensated by differences in heating. I need hardly offer an apology for not adducing experimental data in the article referred to, which was merely an abstract of a report made two years previously for the South Suburban Gas Company, and was not intended for publication. I touched upon the question of aeration of burners quite incidentally, when dealing with the question of inert constituents and calorific value.

It might be of some historical interest to say that the final conclusion of this report was, as far as I know, the first suggestion that gas should be sold on a thermal basis.

R. LESSING.

317, *High Holborn, London, W.C.* 1, *July* 2, 1923.

National Gas Exhibition, Birmingham.—Display of Advertisement Posters.

SIR,—In connection with the above Exhibition, it is proposed to arrange, in a position already reserved for the purpose, a display of posters issued by the various sections of the gas industry; and, at the request of the Exhibition Executive, the "B.C.G.A." are undertaking the arrangement of the display in conjunction with Messrs. Sheffields, Ltd., the well-known Bill Posting Contractors.

We wish to make the display as comprehensive and representative of the gas industry as possible, and to that end manufacturers desiring to take space are invited to communicate with the undersigned. Space is available to show sixteen-sheet, eight-sheet (upright), and four-sheet posters. We need not enlarge upon the excellent advertising value of this display, which doubtless will appeal to all manufacturers.

A small charge will be made for each poster displayed (according to size). All particulars can be obtained from the undersigned.

J. C. WALKER, Secretary.

British Commercial Gas Association,
30, *Grosvenor Gardens, Victoria, S.W.* 1, *July* 9, 1923.

Welsbach Light Company, Ltd.

In the report to be submitted, with the accounts for the year ended March 31 last, to the twelfth annual meeting of the Company tomorrow (Thursday), the Directors state that, subsequently to the last annual report, the Statutory Committee under the Safeguarding of Industries Act reported in favour of the imposition of a duty, under Part II. of the Act, on incandescent gas mantles imported from Germany, on account of the depreciated mark. In accordance therewith, the Board of Trade made an Order which was approved by the House of Commons, and consequently came into effect. The duty imposed under this Part of the Act is one-third of the value of mantles imported from Germany. The further depreciation of the mark and of other continental currencies has, however, enabled imports of mantles into this country and overseas markets to be continued on an increasing scale. The policy of the Board in broadening the basis of the business, by developing trade in various lines of goods in connection with lighting, heating, and other subjects, is being continued; and this development is making progress. The question of reimbursement of excess profits duty by the Inland Revenue Authorities is still unsettled, pending which income-tax and corporation profits tax for the past two years have not been paid. The net profit for the year ended March 31 (including profit on realization of investments and debenture stock redemption, amounting together to £18,092, but without taking account of any excess profits duty recoverable or liability for income or corporation profits tax) is £26,397. To this has to be added the balance brought forward from last year—namely, £18,412, making a total of £44,809. The Directors recommend the payment of a dividend of 5 p.c. (less income-tax) on the issued share capital, £12,896; the payment of a bonus of 2½ p.c. (less income-tax), £6448; the transfer to general reserve of unappropriated discounts on debenture stock redeemed, £7520; leaving a balance to be carried forward (subject as above-mentioned) of £17,945.

Gas Lighting in L.C.C. Schools.—The Education Committee of the London County Council have accepted quotations (and their action has been confirmed by the Council) for improving the gas lighting of a number of their schools. The amounts involved are: Gas Light and Coke Company, £1893 and £137; South Metropolitan Gas Company, £420; Commercial Gas Company, £451; Mr. J. C. Christie, £157 and £220; and Messrs. W. Sugg and Co., Ltd., £130.

REGISTER OF PATENTS.

Carbonization of Carbonaceous Material. No. 172,302.

FRANK, F., of San Francisco.

No. 31,989; Nov. 29, 1921. Convention date, Dec. 1, 1920.

This invention relates to the treatment of carbonaceous and other material by subjecting it to the direction of a flame in a closed chamber. The patentee makes the following claims for the invention:

1. A process for the treatment of carbonaceous and other materials, consisting in treating the material within a closed chamber, maintaining a partial vacuum therein, intimately mixing together in predetermined quantities oxygen and a combustible gas which may be previously formed in the closed chamber, introducing the mixture of gases into this chamber, and subjecting the material to the direct action of the flame produced by burning the mixture, in order to separate the volatile matter from the material.

2. A process as claimed in Claim 1, wherein the flame produced by burning the predetermined volume of gases contains an excess of oxygen, whereby the material is oxidized, without burning any combustible volatile matter or residue which may be produced, except to a predetermined extent.

3. A process as claimed in Claim 1, wherein a reducing flame is produced; this flame containing an excess of hydrogen, and the products of combustion resulting therefrom containing superheated steam, superheated free hydrogen, and free carbon monoxide.

4. A process as claimed in Claim 1, wherein the material is subjected to the direct action of the flame in the presence of inorganic catalysts under the exclusion of atmospheric air.

5. A process as claimed in Claim 1, wherein lignite is treated within the retort and is subjected to a catalytic action; the superheated water vapours contained in the products of combustion interacting with the volatile matter produced, forming montan wax.

6. A process as claimed in Claim 1, wherein the flame produced heats the material under treatment to a temperature above 600° C.; a predetermined volume of steam being introduced, and further heating the material.

7. Apparatus for carrying out the process claimed in any of the preceding claims, comprising an inclined air-tight revolvable retort, a feed-screw delivering the material to be treated to the upper end of the retort (the shaft of the feed-screw being hollow and having a perforated portion extending into the retort), an exhaust fan having a suction pipe connected with the outer end of the hollow shaft to exhaust the gases from the retort; also, lifting means in the lower end of the retort, a screw conveyor for carrying off the residue received by the lifting means under exclusion of air, a burner within the lower portion of the retort and having a feed pipe extending to the outside of the retort, and a mixing device connected with this burner to supply the latter with a combustible mixture of predetermined volumes of gases including oxygen.

Producer Gas.—No. 173,235.

TERRES, E., of Stettin.

No. 34,391; Dec. 21, 1921. Convention date, Dec. 21, 1920.

The object of this invention is the utilization of fuels of a high ash content for the production of gas in a producer; the customary form of grate being eliminated. The patentee puts forward the following claims:

(1) A method of producing gases for heating and other purposes from fuel (particularly of small size) rich in ashes, in a gas-producer without the usual firebars. The producer is provided with an air-supply device, characterized by the fact that above the level of the air-supplying arrangement a porous slag structure is provided, which extends over the whole of the cross-sectional area of the producer, and through which the air, in a finely-divided and highly-heated state, passes to the fuel.

(2) The production of gases as in Claim 1; the porous hot slag structure being formed in the producer above the level of the air-supply device from the fuel employed for the gas production, the combustion zone of the fuel being on the top of this structure.

(3) The production of gases as in Claim 2; the slag structure being formed by burning out the organic matter of the fuel, and allowing the inorganic constituents to frit together.

(4) The production of gases as in Claim 1, characterized by the fact that, in the producer, first a slag structure is formed from slag pieces, and thereafter the fuel is piled up on the top of this structure; the fuel being burnt with air injected through the latter structure.

(5) A method of producing gases, as claimed in any of the preceding claims; the air being introduced into the gas-producer below the upper surface of the slag structure, in a direction inclined downwardly with relation to the horizontal plane.

(6) The production of gases as claimed in any of the preceding claims, characterized by the fact that the air entering the producer below the upper surface of the slag structure is injected in the form of streams having an inclined direction to each other.

(7) A method of producing gases as claimed in any of the preceding claims; steam being introduced into the slag structure.

Gas-Mantle Supports.—No. 187,941.

RADIUM GLÜHKÖRPER FABRIK GESELLSCHAFT M. B. H., of Berlin.

No. 12,647; May 4, 1922. Convention date, Oct. 25, 1922.

This invention relates to improvements in supports for inverted incandescent gas-mantles which enable the latter to be fixed to burners, the mouthpieces of which are not adapted for supporting them. The supporting device comprises a single annular disc pro-

vided at its external periphery with projections adapted to be bent over around the mantle ring, and at its internal periphery with slots or slotted lugs co-acting with holding means provided on the mouthpiece of the burner.

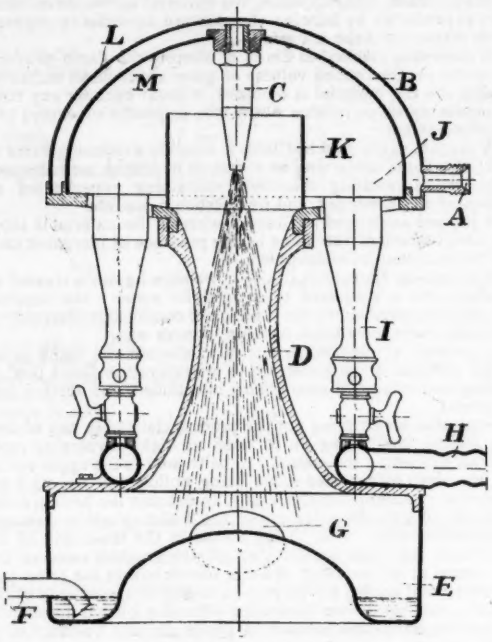
Water-Heating Apparatus.—No. 186,897.

MÉKER, G. A. H., of Courbevoie (Seine), France.

No. 21,231; Aug. 3, 1922. Convention date, Oct. 7, 1921.

This invention relates to improvements in water-heating apparatus of the type in which the water is heated by direct contact with the products of combustion. The flames are produced in a chamber in which a jet of water enters under pressure, and from which it issues through a mixer having a restricted central portion; the flames being arranged circularly about the central jet of water.

The accompanying drawing illustrates the construction of the apparatus.



A French Water-Heater.

The water to be heated is supplied through a pipe A, and fills the space B comprised between a double walled casing L, M, the wall M of which forms a combustion chamber J. There is thus no loss of heat by radiation. In the centre of the wall M is secured a nozzle C; and the water issuing from this nozzle is atomized in a mixer D having a restricted central portion, and collects in a separator E, whence it is discharged through an overflow F. The gas is supplied through a pipe H to a plurality of burners I, arranged circularly about the jet of water, and the flames are allowed to burn fully and normally in the combustion chamber J by the insertion of a cylinder K made of difficultly melting metal and constituting a shield between the jet of water and the flames. The gases of combustion are mixed with the jet of water from the nozzle C, and are led to the separator E, whence they are discharged through an opening G.

The temperature of the hot water may be varied by adjusting the relative amount of fuel and water supplied to the apparatus, which may moreover be fitted with various safety and accessory devices such as automatic valves, by-passes, temperature regulators, &c.

Gas-Governors.—No. 197,496.

STEWART, J. G., of Stratford-on-Avon.

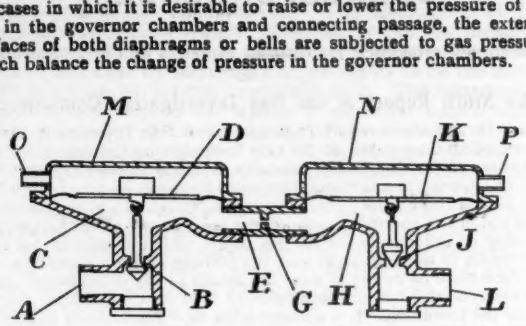
No. 9718; April 4, 1922.

This invention relates to gas-flow regulators of the type in which the flow is controlled by the size of an orifice and the pressure drop of the gas in passing through it.

Formerly it has been customary to govern the pressures by a single pressure governor, placed in the path of the gas before it reaches the orifice. Defects of these flow-regulators are the difficulty of obtaining the very small difference of pressures between the inlet and outlet of the orifice.

This invention comprises, first, a pressure governor of the usual type, termed the inlet governor, in which a fall of pressure in the governor chamber produces the opening of a valve to admit more gas into the chamber; secondly, a pressure governor of the escape valve type, termed the outlet governor, a rise of pressure in the chamber of which produces the opening of a valve and the escape of gas from the chamber; and, thirdly, connecting the chambers of the two governors, a passage restricted anywhere in its length by an orifice of suitable dimensions. The flow takes place from the inlet governor through the passage and orifice to the outlet governor, from the outlet of which the gas is taken wherever it may be desired.

The external surfaces of the bells or diaphragms of one or both governors may be loaded by weights, or acted on by gas pressure in any of the ways customary with single governor regulators, with the additional advantages that increases of pressure, by making them act on the outlet governor, can be used to cause a diminution of the flow. In cases in which it is desirable to raise or lower the pressure of the gas in the governor chambers and connecting passage, the external surfaces of both diaphragms or bells are subjected to gas pressures which balance the change of pressure in the governor chambers.



Stewart's Improved Governor.

The accompanying diagram shows an elevation of the regulator in section. Gas at a suitable pressure enters through the pipe A and the valve B into the chamber C of the governor on the inlet side of the orifice. The valve is attached to the diaphragm D, and it is so shaped and positioned that a rise of the latter, due to an increase of pressure in C, diminishes the valve opening and so restricts the flow of gas into C. The gas passes from the chamber C through the passage E and the orifice G into the chamber H of the governor on the outlet side of the orifice. This governor has a valve J attached to the diaphragm K; and the valve is so shaped and positioned that a rise of the diaphragm increases the valve opening, thus permitting an increased flow of gas from the chamber H into the outlet pipe L. Covers M and N protect the diaphragms, and tubes O and P serve to put the upper surfaces of the diaphragms into communication with the atmosphere or with any other source of pressure.

Gas-Burners.—No. 197,603.

BRIDGEFORD, P. S., of London.

No. 24,535; Sept. 11, 1922.

This invention relates to inverted burners for gas lighting, and refers more particularly to those of the type in which the globe is supported by means of a collar inside the gallery; this collar being adjustable in diameter. A projection outside the gallery has attached to it a screw which passes through a horizontal slot to a nut fixed to one end of the collar inside the gallery; the other end of the collar being riveted to the gallery. On the inside of the latter, opposite to the nut, is a slot through which the collar passes. The latter, on being moved by the projection along the horizontal slot, engages the under part of the rim of the globe. The screw is then turned round until the head presses against the outside of the gallery, and the nut against the inside of the gallery, thereby rendering the collar immovable. To facilitate the movement of the projection, a finger piece is attached to the gallery at the end of the horizontal slot along which the projection is moved.

Distillation of Coal.—No. 197,712.

DAVIDSON, T. M., of Ruislip, and ABBOTT, R. H. S., of London.

No. 1075; Jan. 12, 1922.

This invention relates to means for effecting the feeding of the coal charge, and for applying compression thereto, in order that the residue may be hard and dense and may have other practical advantages.

The feeding worm employed has imparted to it a periodic reciprocation for the feeding forward of the charge and for its compression, and has a reverse rotation, so that after each forward reciprocation the worm works out of the charge in the manner of a screw in a nut. In this way the worm serves as a plunger in effecting the compression of the charge at its plastic stage, and moves backward within the charge before the next forward reciprocation. The charge is thus periodically fed forward as a whole; and in the feeding forward the compression of the charge is effected. The reciprocating worm may be applied within the annular space between a vapour outlet tube and the wall of the retort.

Sulphate of Ammonia.—No. 197,724.

PEASE AND PARTNERS, LTD., and STEPHENSON, G., both of Darlington.

No. 4224; Feb. 13, 1922.

This invention has reference to the method of manufacturing sulphate of ammonia wherein gas containing ammonia, derived from gas-producing plant, is passed through a solution of sulphuric acid in a vessel usually termed a saturator. The sulphate of ammonia thus produced is crystallized-out, and is subsequently dried in a centrifugal machine. It is afterwards neutralized by treating it within a closed vessel with gas containing ammonia, which, combining with the free acid in the salt, converts it into neutral sulphate.

The idea of this invention is to enable the neutralization to be carried out in a more convenient and economical manner. For this purpose, part of the ammonia in the gas flowing to the scrubbers is utilized for the neutralization of free acid in the salt by passing the gas, or a portion of it, into a neutralizing vessel, and bringing it into contact with the salt, with or without steam; the gas so used being afterwards utilized in the saturators, scrubbers, &c.

For carrying out the invention, the neutralizing vessel is arranged either in series with a gas-main leading from the gas-producing plant to the usual saturators, or in a by-pass. The gas may be caused to

flow through the neutralizing vessel either alone or in conjunction with steam.

In the case where the salt is made by the direct process, the neutralizing gas would be taken from the main at a point before that at which it enters the saturators. In the indirect process, the gas would be taken from the main at a point before that at which it enters the scrubber.

When the neutralizing vessel is placed in series with the main, the whole of the gas passing to the bye-product recovery plant will pass through it. When the neutralizing vessel is connected in a by-pass, the gas, together with any surplus ammonia, will be led to the main plant at a point where the ammonia can be absorbed in the usual saturators or scrubbers.

Regulating the Secondary Supply of Air to Gas-Generators.—No. 197,728.

MOORE, S., and HUNTER, C., both of London.

No. 4472; Feb. 15, 1922.

This invention refers to a method of automatically regulating the secondary supply of air to gas-generators of the kind comprising a water-gas generator section and a retort. The main air supply is arranged to deliver the primary air supply to the water-gas generator section in the usual manner; while a branch pipe leads from its main air supply to deliver the secondary air supply. In this pipe leading to the secondary air supply is provided a valve and means to operate it so as to vary the amount of air delivered.

For this purpose the following alternative means may be employed.

(*a*) A pyrometer located in the water-gas generator section arranged to operate the valve through intermediate mechanism, or by direct action.

(*b*) A thermostat operated by the heat of the water-gas generator.

(*c*) A hydraulic device such as (1) a float arranged to slide in a vertical chamber, and means to adjust this and its connection to the valve, or (2) a counter-balanced vessel adapted to hold water so mounted that when empty it is raised to the up-position by a counter-balance weight, or (3) a lever having a float on the end in a system into which water is delivered during each blow of the primary-air blast and thereafter discharged in readiness for the next blow.

(*d*) A clockwork motor, which is put in operation at the commencement of each blow of the primary-air blast and stopped at the termination of each blow, to operate the valve controlling the secondary-air supply.

(*e*) Pneumatically-operated means arranged to actuate the secondary-air valve while the primary-air blast is on.

(*f*) An electric motor arranged to be put in operation when the primary-air supply is opened.

Removing Coke or Ash from Gas-Generators. No. 197,732.

MOORE, S., and HUNTER, C., both of London.

No. 4572; Feb. 16, 1922.

This invention relates to an improved method of either continually or intermittently removing coke or ash in gas-generators of the vertical type, and for supporting the column of fuel without the employment of grates or firebars in the air blast zone and the consequent continual destruction and necessary replacement of these. The patentees make the following claims for their invention.

1.—A method of removing coke or ash from a gas-generator, and for supporting the body of fuel, which consists in the use of a rotatable member which is (*a*) arranged to rotate round a horizontal axis, and (*b*) mounted within a housing so as to form a substantially air-tight fit. The housing for the rotatable member is fixed to a downward extension of the gas-generator; the pockets in the former being adapted to receive the coke from the gas-generator, and to permit it to fall therefrom. Any suitable source of power may be employed.

2.—Means for removing coke or ash from a gas-generator, in accordance with Claim 1, comprising a rotatable member for the delivery of coke or ash having a rotatable spindle, two oppositely disposed radial blades rigidly fixed on this, a curved plate extending rearwardly from the outer edge of each vane, and end plates connecting the curved plates and vanes; the whole being adapted to be rotated within a casing.

3.—A rotatable member for delivering coke or ash having a plurality of metal vanes provided on the rotatable spindle according to Claim 2, and arranged equidistant round the spindle.

Gas-Compressors.—No. 197,755.

EATON, J. G., of Manchester.

No. 5649; Feb. 25, 1922.

The object of this invention is the construction of a compressor containing a minimum number of parts.

The compressor cylinder is cast integrally with the cylinder head in which the suction and delivery valves and connections are situated. The casting is made with the flanged pipe connections similar, so that either connection can serve for suction or delivery in accordance with requirements. The valve-ways in the cylinder head are drilled and finished in accordance with requirements; and a valve cap is provided above each valve—the latter being of the spring-loaded automatic type.

To ensure maximum efficiency, a minimum clearance space is allowed for between the piston, when at the end of its stroke, and the cylinder head; this space being adjustable by securing distance pieces between the head of the connecting rod and the fitting containing the crank pin bearing bushes to which the head is bolted.

To ensure that the pressure in the compressor crank chamber shall not rise due to leakage past the piston during compression, a connection between the chamber and the suction connection of the compressor is provided. The compressor cylinder and crank chamber are cast in one piece; a cover plate being provided for the gap in the bottom of the crank chamber through which access is gained to the interior of the casting for machining and other purposes. One end plate of the crank chamber is removable, and may carry a bearing for the crank shaft end.

To facilitate the adaptation of the casting for a right or left hand disposition of the suction connection, a communicating conduit between the crank chamber and the two pipe connections is provided. The conduit which is not required—that is, the one leading to the delivery connection—is then plugged.

Gas-Producers.—No. 197,743.

BENTLEY, G. H., and APPLEBY, E. G., both of London.

No. 5089; Feb. 21, 1922.

This invention relates to apparatus for feeding fuel into gas-producers, and has for its object to obtain a more even distribution of the fuel.

Gas-producer feeds as at present constructed are provided with central distributing cones or bells; but in practice it has been found that a proper distribution to the centre portion of the fuel bed, especially in large producers, cannot be obtained unless deflectors are used.

According to this invention, a central cone having a number of slots is provided, the slots varying in number and size depending upon the fuel used. The bell is attached to, and rotates with, a rotating feed mechanism. As each fuel charge falls on to the bell, a certain quantity of fuel passes through the slots of the centre portion of the fuel bed, thus assuring even distribution.

Smokeless Fuel.—No. 198,503.

MIDLAND COAL PRODUCTS, LIMITED, of Ironville, and FISHER, A., of East Kirkby.

No. 9247; March 31, 1922.

According to this invention, the coal is reduced to a convenient size for washing out mineral matter, other than carbon, and if necessary it is then further ground with a view to obtaining a uniform or homogeneous coke. A binding material, such as pitch, preferably that obtained from an earlier distillation, is mixed with the ground coal, which it is then pressed into briquettes. The form of briquette preferred is the ovoid or spheroid; and the best size is from two-and-a-half to five ounces in weight. This form and size will pack in a retort with fairly uniform interstices throughout the mass.

The briquettes are carbonized in a retort which is constructed so that they can be fed in at the top and removed at the base; the process being continuous. After once starting, the carbonization is effected by their own partial consumption; no fuel or combustible gases being used. The combustion takes place near the bottom of the retort; and it is maintained by blowing in atmospheric air at this point.

A mild controlled combustion is thus set up near the base of the retort; and the mixture of hot gases obtained from this combustion rises uniformly through the briquettes above, and cokes them gently and gradually as they work down to the zone of combustion. Near the bottom of the retort is a belt of inlets, through which air and steam are blown into the retort. Steam alone may be blown in at a lower point in order to cool the briquettes before they are discharged.

The coal is briquetted in a form which will pack with fairly uniform interstices before retorting; and coals and slacks of such low coking index that they are in the ordinary sense non-coking coals, can be satisfactorily dealt with. It is preferable to use such materials as slacks of low coking index and which are not too bituminous; and these give a good yield of oil and gas. Many types of coal, especially breeze or slack of low market value, are suitable. The inventors maintain that the process is efficient, and that the heating is effected by the cheapest means. The oil and gases are carried away and are not re-heated in the retort. The briquettes have a thin skin burnt off the outside which forms an ash coating, which prevents their sticking together; and they fracture like hard homogeneous coke.

Manufacture of Coal Gas.—No. 198,530.

THE UNDERFEED STOKER COMPANY, LTD., and M'EWEN, S. both of London.

No. 11,755; April 26, 1922.

One object of this invention is to carbonize pulverized coal for the purpose of making coal gas, in such conditions that finely-divided coke is obtained, and to use the heat of combustion of the whole or a part of this coke for internally heating the carbonizing retort or chamber. A further object of the invention is to combine the carbonizing chamber with one or more steam-boilers, in such a manner that the portion of the heat of combustion of the coke which is not required for the internal heating may be utilized in raising steam and in externally heating the retort.

The preferred method of conveying the heat of combustion of the coke into the carbonizing chamber is to heat the coal-gas produced, or a portion thereof, in a recuperator heated by combustion of the coke, and to pass the heated coal gas (say, at about 2000° Fahr.) into the carbonizing chamber.

The pulverized coal is caused to fall in a shower down the carbonizing chamber, which is constructed as a tower. The heated coal gas ascends the latter, preferably at such velocity as to preclude convection currents which might tend to be set up by the difference in the temperature of the gases in the top and bottom of the tower. The carbonizing chamber is set in a boiler furnace into which the finely-divided coke is injected, either direct from the bottom of the carbonizing tower, or after some of its sensible heat has been imparted to the coal to be carbonized, to the feed water for the boiler, or to the coal gas which is to be heated. Part of the products of combustion of the coke is passed through the recuperator, through which the coal gas travels into the

bottom of the carbonizing tower, and having so passed may return to boiler. Another part may ascend external flues of the carbonizing tower. The pulverized coal descending the tower is gradually raised in temperature by encountering in its descent gases of increasing temperature, so that low-temperature distillation occurs in the upper part of the tower, while high-temperature conditions obtain in the lower part.

Gas-Radiators.—No. 198,550.

GIBB, D. M., and THE PARKINSON STOVE COMPANY, LTD., both of Birmingham.

No. 14,437; May 22, 1922.

This invention relates to radiators; and its object is to provide for the ready indication of the water level, and for replenishing the supply as required. It comprises the provision of a float chamber in connection with the interior of the radiator, and an indicator adapted for ready inspection. The invention further comprises means for the introduction of water for maintaining the supply in the radiator at the appropriate working level.

The float chamber is made from a short metal cylinder fitted with a detachable cap at each end, and having a side aperture with flange for attachment to the ordinary inlet at one end of the lower part of the radiator. The cylinder has a float, preferably of metal; and from the upper end of this there projects an aluminium rod, which extends through a metal tube connected at its lower end to the top cover of the cylinder, and at its upper end to a filling cup or charger, preferably of oval shape, whereby water can be poured into the cylinder, whence it passes to the interior of the radiator. The upper end of the tube is stayed by means of a bracket attached to the radiator.

At the bottom of the interior of the filling cup there is a tube to support a central gauge glass or inspection tube, through which can be seen the indicator. The position of the top of the rod within the gauge glass serves as an indication of the level of the water in the float chamber beneath it, and hence also the level within the radiator. The glass may be graduated to any suitable scale to give the depth or quantity of water in the radiator represented by varying positions of the top of the rod or indicator.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for June 27.]

Nos. 15,724 to 16,380.

ABBOTT, A. P.—"Apparatus to prevent theft of gas." No. 15,828.
AEBERLI, H.—"Treating tar for road making." No. 16,376.
CHANDLER, D.—"Gas-burners for cooking." No. 16,181.
DALLAS, J.—"Gas-torch." No. 15,868.
FURSE, G.—"Boilers, &c., for gas-stoves." No. 16,098.
GILLOTT, J. W.—"Coke-oven doors." No. 15,744.
GLOSSOP, G. J.—See Gillott, J. W. No. 15,744.
ILLINGWORTH CARBONIZATION COMPANY, LTD.—"Apparatus for heating coal." No. 16,272.
ILLINGWORTH, S. R.—See Illingworth Carbonization Company, Ltd. No. 16,272.
MEYER, P. B.—"Distillation of shale, coal, &c." No. 16,125.
MUNRO, H.—"Open gas-burners." No. 16,237.
REWSE, H. S. SMITH.—"Apparatus for scrubbing, washing, &c., gases." No. 16,167.
SCHMIDT, G. F.—"Gas-radiator grids." No. 15,789.
SOUTH METROPOLITAN GAS COMPANY.—See Chandler. No. 16,181.
THOMPSON, T.—"Geysers, &c." No. 16,236.

[Extracted from the "Official Journal" for July 4.]

Nos. 16,381 to 17,035.

BARON, R.—"Pendant for lighting-apparatus, &c." No. 17,034.
BRAYSHAW, E. R. & S. N.—"Gas-burners." No. 16,799
BURN, L.—"Gas and oil heated cooking-stoves." No. 16,921.
CLARK, F. W.—"Manufacture of gas from coal, &c." No. 16,960.
DEUTSCHE LUFTFILTER-BAUGES.—"Removal of constituents from gases." No. 16,565.
DURAND, E.—"Gas, &c., valves." No. 17,023.
EVANS, O. B.—"Means for controlling water-gas apparatus." No. 16,459.
FISK, J. W.—"Incandescent gas-burners." No. 16,918.
GARTLEY, W. H.—See Evans, O. B. No. 16,459.
GLOVER, J. A. F.—See Burn, L. No. 16,921.
HEYL, G. E.—"Rotary distillation retorts." No. 16,691.
HUMPHREYS AND GLASGOW, LTD.—See Evans, O. B. No. 16,459.
JOHNSON, W. A.—"High-pressure joints for pipes, &c." No. 16,951.
JONES AND ATTWOOD, LTD.—"Gaseous-fluid compressors, pumps, &c." No. 16,801.
LANG, A. A. D., and LANG, LTD., A. D.—"Means for illuminating by diffused reflected light." No. 16,941.
LORENZEN, C.—"Employing heating and combustion discharge gases, &c." No. 16,609.
METERS, LTD.—"Prepayment gas-meters." No. 16,993.
MIDDERIGH, I.—See Jones and Attwood, Ltd. No. 16,801.
MORTIMER, J. E.—"Regulation of flow of fluids." No. 16,712.
NICHOLSON, A.—"Lighting." No. 16,427.
ORME.—T. A.—See Meters, Ltd. No. 16,993.
RADIATION, LTD.—See Brayshaw, E. R. & S. N. No. 16,799.
SCHMIES, G.—See Deutsche Luftfilter-Bauges. No. 16,565.
STÉ. INDUSTRIELLE D'ARTICLES D'ECLAIRAGE.—"Mantleless incandescent gas-burners." No. 16,931.
STANSFIELD, A.—See Meters, Ltd. No. 16,993.
STIMSON, E. F.—"Gas-heated hotplates." No. 16,922.
TIBBS, A. E.—"Incandescent gas-burners." No. 16,404.
TRAVERS, M. W.—See Clark, F. W. No. 16,960.
WOOD, H.—"Prevention of leaking in stuffing-boxes in dry gas-meters." No. 16,400.

PARLIAMENTARY INTELLIGENCE.

Under the extreme pressure on space in the last issue of the "JOURNAL," the "Parliamentary Intelligence" had to be held over. The following "Progress" therefore indicates that made with Bills during the last two weeks.

HOUSE OF LORDS.

Torquay Corporation Bill: Brought from the Commons; read the first time; and referred to the Examiners, who reported that the further Standing Orders had been complied with.

South Elmsall and District Gas Bill: Returned from the Commons, agreed to, with amendments, which were considered and passed.

Oakham Gas and Electricity Bill: Returned from the Commons, agreed to, with amendments, which were considered and passed.

Rawmarsh Urban District Council Bill: Read the third time, with amendments, passed, and returned to the Commons.

Gas Regulation Act.

Copies were presented of drafts of Special Orders proposed to be made by the Board of Trade under section 10 of the Act, on the application of the Burton-upon-Trent Corporation, Milton Regis Urban District Council, Paignton Gas Company, Sevenoaks Gas Company, South Suburban Gas Company, Torquay Gas Company, and the Ware Gas Light and Coal and Coke Company.

A motion by the Earl of Clarendon, that the draft Special Order proposed to be made by the Board of Trade under section 10 of the Act, on the application of the Ipswich Gas Light Company, be approved, was agreed to. A similar motion was made by Viscount Wolmer in the House of Commons, and passed.

HOUSE OF COMMONS.

Progress of Bills.

Macclesfield Corporation Bill: Read a second time, and committed.

South Elmsall and District Gas Bill: As amended, considered; read the third time, and passed, with amendments.

Oakham Gas and Electricity Bill: As amended, considered; read the third time, and passed, with amendments.

Torquay Corporation Bill: As amended, considered; read the third time, and passed.

Swanage Gas and Electricity Bill: Standing Orders not previously inquired into have been complied with; to be read a second time.

South Staffordshire Mond Gas Bill: Reported, with amendments.

Plymouth Corporation Bill: Reported, with amendments, from the Local Legislation Committee.

The Southampton Gaslight and Coke Company have withdrawn their petition against the Southern Railway Bill.

Coke Exports.

Lieut.-Colonel LANE-FOX had the following statement circulated in the Official Report of the 2nd inst., in reply to Mr. Smedley Crooke, who asked for the average cost of coke per ton at ovens in this country, the average price f.o.b. of export coke, and the total amount of coke exported during the first quarters of 1922 and 1923 respectively.

The average price f.o.b. of export coke and the total amount of coke exported during the first quarters of 1922 and 1923 are:

—	Total Amount of Coke Exported.	Total Value.	Average Value per Ton (f.o.b.).
1st QUARTER, 1922.	Tons.	£	s. d.
Gas coke	226,068	345,046	30 6
Other sorts	296,289	451,088	30 5
Total coke	522,357	796,134	30 6
1st QUARTER, 1923.			
Gas coke	294,553	428,941	29 2
Other sorts	489,237	863,654	35 4
Total coke	783,790	1,292,595	33 0

The Secretary of Mines had not the necessary information to enable him to give average quarterly figures of the price of coke at ovens.

Pitch Cancer.

Mr. BRIDGEMAN, replying to Mr. D. Williams, stated that the number of men reported to the Factory Department as suffering from pitch cancer during the five years 1918 to 1922 was as follows: In 1918, 23; 1919, 10; 1920, 25; 1921, 18; and 1922, 15. No fatal cases were reported in 1918 to 1920; two were reported in 1921; and one in 1922. Before 1920 the disease was not compulsorily notifiable under the Factory Act, but cases were notified under a voluntary arrangement. The figures do not indicate any growth in the incidence of the disease. As regards mechanical appliances, he understood that these were generally used, where practicable, but that they could only be employed in a few operations. The most effective precautions against the disease were great attention to personal cleanliness, and periodic medical examination; and facilities to enable the worker to take these precautions had been arranged for at the instance of the Factory Department at all the works concerned.

PLYMOUTH CORPORATION BILL.

The Local Legislation Committee of the House of Commons, presided over by Sir THOMAS ROBINSON, has approved of the gas clauses in this Bill. They are of the ordinary form. [See "JOURNAL," Feb. 14, p. 386, and May 9, p. 360.]

SOUTH STAFFORDSHIRE MOND GAS BILL.

This Bill [see "JOURNAL" for Jan. 3, p. 33, and March 28, p. 842] was ordered by the Unopposed Committee of the House of Commons, presided over by Mr. J. FITZALAN HOPE (Chairman of Ways and Means) on Wednesday of last week, to be reported for third reading.

Mr. T. SEAGAR BERRY (Messrs. Sherwood & Co., Parliamentary Agents) said that this Bill was promoted by the South Staffordshire Mond Gas (Power and Heating) Company, which (he believed) was the only one of its kind. It was incorporated by statute in 1901 to supply power gas in a large area in South Staffordshire and East Worcestershire. At that time, owing, as he understood, to the fear on the part of other gas undertakers in the district that they might be liable to competition, provisions were put into the Company's Act of 1901 which prohibited them from supplying gas for illuminating purposes and for use in private dwelling houses. The present Bill proposed, not actually to repeal those provisions, but to say that the Company may, notwithstanding those provisions, supply gas in bulk to other gas undertakers. It contained, however, the provision that those gas undertakers were not to supply this gas to their consumers except in accordance with the Acts and Orders which regulated them. They must supply in accordance with the proper provisions as to thermal value, purity, or anything else which applied to them in supplying their own gas to their consumers. The promoters had communicated with the Board of Trade on this clause, but the Board had not thought it necessary to make any report.

Replying to the CHAIRMAN, Mr. Berry said that the Company had a very large output. They used 55,000 tons of coal per annum, and supplied millions of cubic feet of gas to factories.

Dealing with finance, Mr. BERRY said that the Company were originally incorporated with £1,000,000 authorized ordinary capital, and with the usual one-third borrowing powers. They did not ask at that time for half the capital to be raised by preference shares. In 1913, however, Parliament allowed them to raise half the capital on preference; and the amount actually raised was £82,500 preference and £340,712 ordinary. The Company were still, as were many pioneers, not finding it too easy to raise money, and in 1917 Parliament had authorized them to raise £205,000 (authorized loan capital remaining to be issued) by borrowing on mortgage or by the creation and issue of debenture stock, irrespective of the amount of the share capital of the Company actually raised at the time. By another Act of the same year (it being hoped that the Ministry of Munitions would make the advance), the Company had obtained power to raise this £205,000 by prior lien debenture stock to be issued to the Minister of Munitions. None of this money, however, was ever issued. The arrangement with the Ministry of Munitions had not come to a head, and the money had still not been raised. All that the Company asked in the clause in the present Bill relating to debenture stock was that they might borrow money, which Parliament had said they might do from the Minister of Munitions, or from anybody else who would be good enough to lend it.

The CHAIRMAN said he gathered that, if and when this money was raised, the Company's loan capital would still be within one-third of the authorized share capital.

Mr. BERRY replied that it would be within one-third of the authorized, but not the issued, capital.

In reply to Sir ERNEST MOON, Mr. Berry said that the main reason the money was wanted was to supply areas which the Company had been asked to supply, but to which they had not gone for want of money to lay mains.

Asked by the CHAIRMAN how the money was to be applied when raised, Mr. Berry said the Company would want about £50,000 to pay off the bank overdraft; they would like to spend about £40,000 on extending mains; and the remainder could be raised as time went on in order to expand their business. They had sufficient plant to enable them to supply double the amount supplied to-day.

Asked what was the difference between Mond gas and other gas, Mr. Berry explained that Mond gas was produced from a bituminous coal which was very much cheaper than the ordinary gas coal. The difference to-day was as between 18s. 5d. and 30s.; and gas was sold by the Company at something under 1s. per 1000 c.ft. The Company relied very much on using this coal up to the last bit of ash, and obtained a profit, to some extent, from bye-products. There was no coke produced, but a large supply of other residuals—such as sulphate of ammonia, tar, and coal-tar products.

The CHAIRMAN said that if other undertakers purchased Mond gas, they would be enabled to supply gas to their consumers more cheaply by mixing the Mond gas with their own coal gas.

Mr. BERRY replied that this was what they hoped to do, and at the same time the Company would have a bigger output. There was only the one works—at Dudley Port.

Explaining a clause in the Bill relating to gas rents, &c., Mr. BERRY said it allowed the Company, in cases where they had to go to the High Court to get leave to issue distress, to go straight to the High Court and obtain leave without first going to the Magistrates. There were cases in which receivers were in possession of undertakings, where the Company would have to go to the Magistrates and obtain a warrant, but would still have to go to the High Court to get leave to use it.

The CHAIRMAN asked if there were precedents.

Mr. BERRY replied that there were not, but there were precedents for something much stronger—giving the undertaker the power of a landlord to recover by distress. The Company had proposed this in the Bill originally; but at the suggestion of the Home Office, they had brought it down as he had stated.

Mr. A. G. JOHNSON (Solicitor for the Bill) proved the preamble.

Barnsley Gas Special Order.—An Order under section 10 of the Gas Regulation Act, which the Board of Trade propose to make in respect of the Barnsley Gas Company, was the subject of an inquiry last Thursday by a Committee of the House of Commons. A report of the proceedings is in type, but unfortunately pressure on our space has compelled the holding-over of it until next week.

LEGAL INTELLIGENCE.

EDINBURGH TRADERS AND THE GAS CORPORATION.

The Petition Dismissed.

In the Edinburgh Sheriff Court, last Wednesday, Sheriff Orr, K.C., having heard Counsel for the parties and considered the points involved in the action raised at the instance of John Keppie Paterson, J.P., and other traders against the Corporation of Edinburgh, sustained the first plea in law for the defenders, and dismissed the petition with costs. The arguments in the case were reported in the last volume of the "JOURNAL"—pp. 360, 491, and 803.

Sheriff ORR, in his note, said that the first crave of the petition was that the defenders be ordained to permit the pursuers, who were municipal electors in Edinburgh, to inspect and examine the accounts kept by the defenders, in terms of section 144 of the Edinburgh Boundaries Extension and Tramways Act, 1920, together with the auditor's confirmation thereof, and special report thereon, if any. The second crave was for a finding that the defenders were bound to deliver to each of the pursuers, on payment of a certain fee, an abstract of these accounts and confirmation thereof. In the averments in support of these two craves, pursuers said that the defenders had furnished to them an abstract of their accounts after demand, but that they had declined to allow pursuers to inspect or examine the accounts. They stated that the defenders had produced neither accounts nor abstracts showing the auditor's confirmation. They also denied that the documents produced to them by defenders were the "accounts" of defenders, and averred that they were only abstracts thereof. But another statement was added, apparently at adjustment, to the effect that "the auditor's confirmation of said abstracts was now produced for the first time to pursuers, despite their previous demands therefor." The pleas in support of this part of the pursuers' case were that pursuers were entitled, in terms of the Statute, to inspect and examine defenders' accounts, and that they were also entitled to obtain an abstract of the accounts with the auditor's confirmation. It was unfortunate that any controversy should have arisen over this matter. Both pleas were unquestionably well founded, and defenders on their side did not dispute this. The confusion arose through the defenders themselves speaking sometimes of "abstracts" and sometimes of "accounts," when actually they meant one and the same thing. If defenders were responsible for this confusion, both in their printed documents and in their letter, pursuers went beyond their rights under the Statute in demanding an opportunity of examining defenders' books and accounts. There was no warrant for that in the Statute. The important question was whether the gas supply account kept by the defenders, a copy of which was furnished to pursuers under the misleading title of an "abstract," was, in point of fact, the account in terms of the Statute. If it was, then the pursuers had already in their hands what in their first two craves they asked for. The dispute as to its proper title was nothing more than a dispute about words, which defenders might have obviated by adhering to the language of the Statute. He was of opinion that the gas supply account was in conformity with the requirements of the Statute. There was one item in the revenue account which was commented on during the hearing—general expenses of management, £15,000. It was objected that further inquiry was needed as to this large item, because pursuers thought, or suspected, that part of the expense of the showrooms (of which they complained) was concealed in the item of £15,000. This sum of £15,000, taken from the gas supply account, appeared on the revenue side of the general police purposes account, out of which were paid the expenses of the Town Clerk's and City Chamberlain's Departments, Collector's Department, and various others. Into it were paid contributions from the various departments and trading undertakings which got the benefit of the services of the Town Clerk, City Chamberlain, Collector, and other officials. As the officials in question were not attached to any one department, it was thought proper that all these departments should contribute a quota towards their support in proportion to the work done for them. The £15,000 was the contribution of the gas undertaking. The last point he noticed as to the form of the accounts was the certificate by the City Auditor, stating that he had examined "the accounts" for the year in question, and found them correctly stated and sufficiently vouched and instructed. This was followed by a certificate of approval signed by the Lord Provost, City Treasurer, and Town Clerk. All this was in obedience to the provisions of section 150 and 151 of the Act. It thus appeared that the accounts had satisfied the independent official appointed by the Secretary for Scotland.

The third conclusion raised the vital question in controversy between the parties. It objected to the item of £4063 10s. 2d. on the credit side of the revenue account, "Gas-Fires, &c.," under the heading "Rental of Gas-Fires, Meters, &c." The contention was that the revenue from this source should have been much larger, if defenders had conducted their business properly by hiring the various appliances at rates adequate to meet the annual cost of providing, fitting, and maintaining these appliances. It was said that, on the contrary, the defenders acted illegally by lending out the appliances, gratuitously, or hiring them at inadequate rates. The revenue which should have been earned was therefore not earned. The £4063 10s. 2d. was said to be short by £17,508 4s. 11d. of the sum which ought to have been earned, and it should be increased by this sum, or some other unnamed sum which would represent the amount of hires at reasonable rates of the gas appliances supplied gratuitously or at inadequate rates. This was put alternatively by saying that the sum of £17,508 4s. 11d. (or other unnamed sum) was not entered on the credit side of the revenue account, and that such a sum should be included as a separate entry in the account. This sum of £17,508 4s. 11d. was chosen so as to make up (with the £4063 10s. 2d.) a total of £21,571 15s. 1d. on the opposite side of the account—being the total amount spent on fitting and maintaining gas-cookers, fires, &c. Defenders objected to this crave as incompetent in the present proceedings. They pointed out that

to increase the revenue derived from rental of the fires, &c., from £4063 10s. 2d., by adding a sum of £17,508 4s. 11d., would be to include a revenue which, in point of fact, was not earned in the year in question. In other words, the account would not thereby be rectified, but falsified. The attack here was based on the allegation that the defenders' method of trading was, as regarded their supplying of gas appliances, *ultra vires* and illegal. The case of *Kemp* (*1919 and 1920*), based on a section of a Glasgow Corporation Act similar to section 153 of defenders' Act, showed that the Court would, in certain circumstances, entertain an objection to a payment on a relevant allegation that it was illegal or *ultra vires*, and would, if necessary, allow proof to ascertain the facts. The pursuers in that case pointed to specific items of expenditure out of the Common Good, averred that it was illegal expenditure, and asked that the items should be disallowed and the account rectified accordingly. The result would have been, if pursuers' averments had been proved, that the items complained of would have been struck out, and the account thereby rectified. It appeared to him that there was a broad distinction between that type of case and the present. The pursuers did not here complain that the entries were illegal. Both were in themselves unobjectionable. What they complained of was that defenders, by their illegal method of trading, had failed to earn a larger income, and that this hypothetical larger income did not appear in the account. Assuming pursuers' averments about illegal methods of trading were relevant, it seemed to him that, from the nature of the case, it could not be known whether there was any such loss of income as pursuers supposed; or, if there was some loss of income, what that loss was. Pursuers put the figure at £17,508 4s. 11d., "or such other sum as would have represented the amount of hires at reasonable rates of such gas appliances supplied by the defenders to consumers of gas as were hired gratuitously or at inadequate rates by them." But this was on the assumption that all the consumers of gas who were willing to accept gas appliances when they were offered gratuitously or at inadequate rates, would also have been willing to hire them if they had been told they must pay full rates for them. This was a wholly unwarrantable assumption. It was a mere speculation how many, among the many hundreds or thousands of householders concerned, would have been willing to pay the charges which pursuers thought should have been exacted. The figure, therefore, which pursuers asked to be inserted in the account as necessary to rectify it, was a purely arbitrary figure, because it was impossible to ascertain what income had been lost under this head. Another and wider consideration entered into the matter. Defenders, as he understood their position, justified their action upon the ground that, assuming, but not admitting, that their method of supplying gas appliances was *ultra vires*, the result was that the consumption of gas by the community was thereby greatly increased. The appliances facilitated the use of gas for heating, cooking, and the like, with the result that an increased revenue was earned by the gas undertaking as a whole, thereby reducing the on-cost charges and cheapening the price of gas. They said, therefore, that no loss, but gain, resulted to the business of the gas undertaking as a whole through their operations in this particular part of it. From the nature of the case, it was impossible to show in figures the amount of the gain. Therefore he came to the conclusion that the pursuers' demand was ill-founded on a double ground. The figure of £17,508 4s. 11d. which pursuers said should be added to the revenue side of the account, would not rectify the account, because that sum was, in point of fact, not earned. There was no such revenue. The figure, if it represented anything, represented an estimate of the loss or damage sustained through the method of trading adopted by the defenders. But it was a purely arbitrary estimate; and there were no data for arriving at a correct estimate of the supposed loss or damage. The pursuers, he thought, had mistaken their remedy. If they believed that defenders had been carrying on trade beyond the powers which their Statute gave them, they had a remedy at Common Law.

The fourth, and last, crave was that defenders should be ordained to set forth distinctly reasonably full and detailed entries both of debit and credit in relation to the carrying-on by them of the showrooms connected with the supply of gas for the year in question. They said that defenders had purchased or leased premises for showrooms for exhibiting to intending customers and others gas-cookers, &c., and spent money in paying salaries and wages to the officials, workmen, and servants in connection therewith. It was admitted that the defenders had purchased or leased such premises, and used them as showrooms in the manner explained; and it was said that this was reasonably incidental to the exercise of their statutory powers. Their Statutes, it was not disputed, gave defenders powers to sell and let for hire gas fittings and appliances; and if they used their showrooms for displaying to the public the articles which they were entitled to deal in, this seemed to him to be a matter within their discretion in carrying on their business. Underlying the demand of the pursuers was the view that the showrooms were a distinct or separate department of the gas supply business. They said that the accounts of this department should be separately shown. This view appeared to him to be erroneous. The exhibiting of the appliances in the showrooms was simply an attractive and convenient way of displaying their goods and encouraging people to deal with them. It was all part and parcel of the gas supply business. The pursuers wished the account to be recast; but they did not say the expenditure was not all of it contained in the amount under appropriate headings. He thought that account was in conformity with the Statute; and the methods of stating the various items had satisfied the auditor.

ACTION FOR PERSONAL INJURY.

On Monday and Tuesday, June 25 and 26, the action of *Lambert and Others v. the Brentford Gas Company and J. M. Howe* was tried before Mr. Justice Acton and a Special Jury, the plaintiffs, G. H. Lambert, Alice Maude Lambert, and H. J. Hicks, seeking to recover damages for personal injuries caused through the alleged negligence of the defendants. It appeared that on Nov. 3, 1922, at 11.30 p.m., the plaintiffs were passengers in a taxicab owned and driven by the defendant, Howe, when the cab fell into an excavation in the roadway at the junction of the Uxbridge Road and East Acton Lane. The negligence alleged was that the Gas Company had made an excavation in the roadway for the purpose of laying gas-mains, and had left it in such a state as to constitute an obstruction and danger to users of the roadway, failing to give sufficient warning of the existence of the excavation, and failing to provide sufficient means to prevent users of the roadway from falling into the excavation. The Gas Company denied liability, and alleged that the accident was due to the negligence of the driver of the taxicab. After hearing the witnesses, the learned Judge, in summing up, left it to the jury to say whether the Gas Company had been guilty of a breach of the duty which was imposed upon them as a public body of providing adequate lighting and watching when making excavations in the roadway, and an absence of care on the part of Howe in the way in which he drove the cab. It was for the Jury to say which of the defendants was liable or whether both were responsible. The Gas Company had called evidence to prove that they had done everything that was necessary on their part, and it was said that the taxicab fell into the hole through the carelessness of the driver. The Jury found in favour of the defendant, Howe; and judgment was entered for him with costs. As against the Gas Company, the Jury found they were guilty of negligence, and assessed the damages as follows: Mr. Lambert £101 7s., Mrs. Lambert £25, and Mr. Hicks £34 16s. Judgment was entered accordingly.

L.C.C. and Lighting of Schools.

At the meeting of the London County Council last Tuesday week, the Education Committee submitted an estimate of £182,515 in respect of fuel, gas, electricity, and water for the year 1923-24. The estimate for gas and electricity was based on the actual expenditure for the year 1921-22, with an anticipated average reduction of 20 p.ct. in the price of gas. Allowance had been made for economies resulting from the installation of modern burners. Alderman Mrs. Mathew had given notice of an amendment instructing the Finance and Education Committees "to consider and report as to the submission of a supplemental maintenance estimate of £2500 in respect of the repair of gas-fittings and the provision of gas-mantles in cases in which it is considered impracticable to substitute electric for gas illumination." After a short discussion, she agreed to withdraw the amendment on Mrs. Wilton Phipps (Chairman of the Education Committee) undertaking to bring the matter before the Committee. Mrs. Phipps gave the following particulars. During the year 1922-23, the gas lighting of forty-nine schools had been improved at a cost of £5257; and so far this financial year seventeen schools had been dealt with at a cost of £3270. The Buildings Sub-Committee had before them a comprehensive report with regard to improving gas lighting in elementary schools. The sum of over £5000 was included in the estimates for improving the lighting of evening institutes only. The Sub-Committee were receiving a deputation from the Poplar Borough Council to discuss the question of the installation of electric light in schools in that Borough. The estimate was approved.

European Gas Company, Ltd.

The Directors reported at the meeting of shareholders yesterday that, though the results of the Company's operations in France have been not unsatisfactory, the profits, when converted to sterling, have been affected adversely by the depreciation in the exchange value of the franc, which on March 31 last stood at Frs. 70.40, as compared with Frs. 48.50 on March 31, 1922. The profits are, however, sufficient to allow of the payment of a dividend at the rate of 5 p.ct., free of tax, for the year. An interim dividend of 2½ p.ct. was paid on Feb. 1 last; and the Directors now recommend the payment of a final dividend at the same rate, the balance being carried to general revenue. The special efforts which have been made to extend the use of gas appear to be bearing fruit, as the number of consumers has increased from 122,087 to 126,755 during the year, or at the rate of 3·82 p.ct. The high prices which it is unfortunately still necessary to charge for gas stand in the way of any considerable development of the consumption, which, nevertheless, shows an increase at the rate of 1·11 p.ct. as compared with the previous year. The negotiations with the Municipal Authorities of Bolbec, with a view to settling bases for the calculation of the future price of gas and establishing the compensation due to the Company on account of past losses, have been brought to a satisfactory conclusion; and the Company's concession has at the same time been extended by sixteen years until 1970. A contract has been concluded with the Commune of Wimille, between Boulogne and Wimereux; and the supply of gas will be commenced as soon as the necessary mains have been laid. The works and plant at the stations were maintained in a state of efficiency; and considerable progress was made during the year with the systematic examination and repair of the mains, which had inevitably suffered during the war. Carburetted water-gas plants are being installed at Boulogne and at Caen. In September last, the Company's offices were transferred to Montague House, Devonshire Square, London, E.C.2, where the additional space available permits of more efficient organization and a more suitable accommodation of the staff.

The price of gas in Cupar is to be reduced by 3d. per 1000 c.ft., with a discount of 5d. on all accounts paid within one month. This makes the net price of gas 4s. 3d. per 1000 c.ft.; while for engines the charge will be 3s. 10d. if paid within a month of the meter survey.

We have received from Messrs. Curtis's and Harvey's Gas Mantle Department, Nos. 51-55, Garratt Lane, Wandsworth, S.W.18, a copy of their latest price-list, No. 237, dated July, 1923, which shows considerable reductions in the prices of "Ironclad" mantles. The substantial reductions made will, it is hoped, create a greater demand for these well-known mantles, and so help to provide more employment for British workers at the factory at Earlsfield, S.W. A copy of the list referred to will be sent to all who make application to the above-mentioned address.

MISCELLANEOUS NEWS.

GAS REGULATION ACT APPLICATIONS.

The following further notices have appeared in the "London Gazette" with regard to applications to the Board of Trade for Orders under the Gas Regulation Act.

Brockenhurst Gas Company.

The maximum price now authorized in respect of the supply of gas by the undertakers is 5s. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 1s. 10d. per therm.

Flint Gas and Water Company, Ltd.

The maximum price now authorized in respect of the supply of gas by the undertakers is 5s. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 1s. 6d. per therm.

Honley Urban District Council.

The maximum price now authorized in respect of the supply of gas by the undertakers is 4s. 4d. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 1s. 1d. per therm.

It is also proposed that an additional charge of 2d. per therm should be authorized in respect of gas supplied through a prepayment meter.

Knaresborough Urban District Council.

The maximum price now authorized in respect of the supply of gas by the undertakers is 4s. 6d. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 1s. 6d. per therm.

It is also proposed that an additional charge of 3d. per therm should be authorized in respect of gas supplied through a prepayment meter.

Woodhall Spa Gas and Water Company.

The maximum price now authorized in respect of the supply of gas by the undertakers is 6s. per 1000 c.ft.; and the price they have asked the Board of Trade to substitute for this is 1s. 6d. per therm.

It is also proposed that additional charges per therm should be authorized in respect of gas supplied through a prepayment meter.

DECLARATIONS OF CALORIFIC POWER.

Bridgend Gas Company.—425 B.Th.U. (Oct. 1.)
Hayfield Gas Company, Ltd.—500 B.Th.U. (Oct. 1.)
Ripon Corporation.—450 B.Th.U. (Oct. 1.)
Southwell District Gas Company.—500 B.Th.U. (Oct. 1.)
Wigan Corporation.—480 B.Th.U. (July 15.)

GAS REGULATION ACT ORDERS.

There have been forwarded by the Director of Gas Administration copies of the following further Orders made by the Board of Trade under section 1 of the Gas Regulation Act.

Beccles Water and Gas Company.

After the declared date, the maximum price in respect of gas supplied by the undertakers shall be 18d. per therm. (July 2.)

Golborne Gas Company.

After the declared date, the standard price in respect of gas supplied by the undertakers shall be 12·8d. per therm.

For the purpose of ascertaining the authorized rate of dividend, any price charged per 1000 c.ft. before the declared date shall be rendered into the equivalent price per therm by dividing it by five. (June 29.)

Loughborough Corporation.

After the declared date, the maximum prices in respect of gas supplied by the undertakers shall be 13d. and 14·2d. per therm; and these prices respectively shall be substituted for the prices of 3s. 6d. and 4s. per 1000 c.ft. mentioned in section 35 (limiting the price of gas) of the Loughborough Corporation Act, 1899. (July 5.)

Market Harborough Urban District Council.

After the declared date, the maximum price in respect of gas supplied by the undertakers shall be 11·8d. per therm. (July 5.)

North Pembrokeshire Water and Gas Company.

After the declared date, the maximum price in respect of gas supplied by the undertakers shall be 18·2d. per therm.

Prepayment meter clauses are included. (July 5.)

Wigan Corporation.

After the declared date, the maximum prices in respect of gas supplied by the undertakers shall be 12·6d. and 13·9d. per therm; and these prices respectively shall be substituted for 4s. 2d. and 5s. 6d. per 1000 c.ft. mentioned in section 41 (limiting the price of gas) of the Wigan Gas Act, 1861.

Prepayment meter clauses are included. (June 27.)

Tamworth Gas Order.—The Tamworth Town Council decided at a recent meeting to make representation to the Board of Trade with regard to the application of the Tamworth Gas Light and Coke Company for an Order seeking power to charge for gas by thermal units at a fixed maximum of 1s. 8d. per therm, which the Council considered was excessive.

Price and Profit at Padiham.—It was decided by the Padiham Council last Thursday week to reduce the price of gas by 6d. per 1000 c.ft. The net profit for the year, it was stated, was £3012; while the estimated profit for the current year was £2600, less 4d. reduction, £1800, which would leave them with a balance of £800. The present price of gas is 23·55 p.ct. over the pre-war figure.

REPORT OF THE BIRMINGHAM GAS COMMITTEE.

The report for the year ended March 31 states that, in view of the reduced cost of gas production, and the desirability of still further encouraging the use of gas, the Committee reduced the price by 3d. per 1000 c.ft., as from the March meter readings. The following scale indicates the old and the new prices:

For Lighting, Cooking, and Domestic Purposes in One Premises.

—	Previous Price.	Price as from March, 1923.
	Per 1000 C.Ft.	
	s. d.	s. d.
Up to and including 100,000 c.ft. per quarter	3 10	3 7
Quantity in excess of—		
100,000 c.ft. up to 500,000 c.ft. per quarter	3 9	3 6
500,000 ,, ,, 1,000,000 ,, ,,	3 7	3 5
1,000,000 ,, ,, 2,000,000 ,, ,,	3 6	3 3
2,000,000 ,, ,, 3,000,000 ,, ,,	3 4	3 1
3,000,000 ,, ,, 4,000,000 ,, ,,	3 1	2 10
4,000,000 ,, per quarter	2 10	2 7

For Manufacturing and Motive Power in One Premises

—	Previous Price.	Price as from March, 1923.
	Per 1000 C.Ft.	
	s. d.	s. d.
Up to and including 1,000,000 c.ft. per quarter	3 4	3 1
Quantity in excess of—		
1,000,000 c.ft. up to 2,000,000 c.ft. per quarter	3 1	2 10
2,000,000 ,, ,, 3,000,000 ,, ,,	2 10	2 7
3,000,000 ,, ,, 4,000,000 ,, ,,	2 7	2 6
4,000,000 ,, per quarter	2 4	No reduction

Subject to 5 p.ct. discount for prompt payment.

The number of cubic feet supplied per penny through prepayment meters has been altered as follows:

—	Installations in use Less than 10 Years.	Installations in use 10 Years and Upwards.
	C.Ft.	C.Ft.
With meter only	From 21½ to 23	From 21½ to 23
With meter and Corporation fittings	,, 20½ to 22	,, 21½ to 23
With meter and Corporation cooker	,, 19½ to 21	,, 20½ to 22
With meter, Corporation cooker, and fittings	,, 18½ to 20	,, 20½ to 22

The accounts show a surplus of £52,418, which has been carried to the special maintenance account. The restrictions imposed by the Order relating to the Birmingham gas undertaking, which was made under the Statutory Undertakings (Temporary Increase of Charges) Act, 1918, prevent the surplus on the year's working being applied to the relief of the rates.

The following are comparative statistics for the years ended March 31, 1922 and 1923.

—	1922.	1923.
Gas sold c.ft.	10,264,218,300	10,937,923,300
New services laid	2,592	2,795
Cooking and heating stoves sold	1,901	2,235
Total number of cooking and heating stoves on hire at March 31	71,700	74,001
Total number of cookers supplied with meters at March 31	99,478	100,569
Total number of prepayment meters fixed, or on consumers' premises, at March 31	103,363	104,737

British Dyestuffs' Report.

The Report of the British Dyestuffs' Corporation for the year ended Oct. 31, 1922, shows a profit of £102,656, after crediting the further amount estimated to be recovered in respect of excess profits duty, and after providing £411,382 for depreciation. For the previous year, the profit, after providing £467,106 for depreciation, and crediting excess profits duty refund, totalled £437,683; but stocks had to be written down by £1,444,343, and resulted in a deficit being carried forward of £803,355, now reduced to £700,698 by the profit on the past year's working. In spite of severe restriction in the manufacture of dyestuffs, due to the serious depression in the dye-using industries, and of substantial reductions in selling prices, the trading results for the year under review show a marked improvement over those for the previous year; and continued progress has been made both in research and in the improvement of processes of manufacture. The Corporation's undertakings are now capable of meeting to a very large extent the requirements of the colour users in this country. The liquidation of surplus stocks accumulated in previous years has been completed, and stocks on hand have been written down to current market values. At the date of the report the Company had in the bank, or invested in easily realizable securities, a total sum of more than £2,000,000.

MANCHESTER GAS DEPARTMENT REPORT.

At a recent meeting, the Gas Committee of the Manchester Corporation—the Chairman (Sir William Kay) presiding—adopted the report for the year ended March 31 for presentation to the City Council.

The following is a summary of the items of income and expenditure; the figures for the previous year being also given for the purpose of comparison. The summary excludes all transactions appertaining to the acquisition and administration of the Stretford Gas Company's undertaking.

1922.			1923.	
£	£	INCOME.	£	£
	1,318,610	Gas, &c.		1,172,215
		Residuals, &c.—		
339,319		Coke	257,789	
60,004		Tar	102,437	
11,372		Sulphate of ammonia	19,210	
	410,695			379,436
	2,178	Sundry receipts		3,101
	1,731,483			1,554,752
		EXPENDITURE.		
		Manufacture—		
808,837		Coal and oil	621,522	
334,106		Carbonizing wages, maintenance of plant, &c.	234,061	
22,627		Renewals	33,045	
	1,165,570			888,628
		Distribution—		
177,994		Maintenance of plant, salaries and wages, &c.	158,522	
56,369		Renewals	62,959	
	234,363			221,481
	101,103	Rents, rates, &c.		82,216
		Management, collection, &c.—		
43,820		Salaries and wages	35,833	
6,326		*Less*—Receivable from Electricity Committee for collection of accounts	5,687	
37,494			30,146	
42,918		Other charges	41,132	
	80,412			71,278
	1,581,448			1,263,603
	150,035	Gross profit for the year		291,149
81,880		*Less*—Interest on loans, &c.	95,295	
3,265		Income-tax	11,229	
	85,145			106,924
	64,890	Net profit		184,625

The quantity of gas sold was 6,169,724,000 c.ft., an increase of 3·49 p.ct. on the corresponding figures for the previous year; and the average price realized was 3s. 8·76d. per 1000 c.ft., as against 4s. 4·30d. for the previous year.

The cost of coal and oil carbonized was as follows; the figures for the previous year being given for comparison:

—	Gross Cost.	Less Income from Residuals.	Net Cost.
	s. d.	s. d.	s. d.
Last year, per 1000 c.ft. sold	2 0·18	1 2·76	0 9·42
Previous year " "	2 8·56	1 4·53	1 4·03

The reduction in the net cost represents a saving to the Committee of £169,924. The average gross cost of coal only, inclusive of cost of handling, was 29s. 3·52d. per ton, as compared with 39s. 10·74d. for the previous year.

The amount transferred from revenue to the credit of renewals account was £97,327, which, with the interest on the fund, made a total credit for the year of £101,260. The sum of £83,423 was expended during the year. The balance to the credit of the account is now £148,942.

Additional loan capital, excluding that required in connection with the Stretford gas undertaking, has been raised to the extent of £240,000 during the year, mainly for the extensions in progress at the Bradford Road works, and for distribution purposes. The expenditure for the year amounted to £298,126, of which sum £36,152 was provided out of profits and the balance out of loans. The total capital outlay at March 31 was £4,442,942, the loan debt in respect of which was £1,717,719.

Estimates amounting to £900,000 for the acquisition of the necessary land and for the construction of the first unit of plant at the proposed works at Partington, as authorized by the Manchester Corporation (General Powers) Act, 1921, were approved by the City Council on Feb. 7; but no constructional work has yet been commenced. It is intended, however, that the work shall be proceeded with as soon as the necessary preliminary arrangements have been completed.

There have been three important general reductions in the price of gas during the year. They were as follows:

To all consumers as from March, 1922, 4d. per 1000 c.ft., with concessions to users of gas for manufacturing purposes.

3d. per 1000 c.ft. to all consumers as from September, 1922, with concessions in respect of gas used for cooking for trade purposes, and of large quantities used for manufacturing purposes.

6d. per 1000 c ft. to all consumers as from December, 1922.

These reductions range from 25 to 35 p.ct. on the prices ruling at the close of the previous financial year.

COVENTRY GAS UNDERTAKING.

Annual Report.

The annual report of the Gas Committee of the Coventry City Council was presented at a recent meeting of the Council. The report showed a profit of £28,866, and a disposable surplus (including the £39,154 brought forward from last year) of £68,020. The Committee, being excluded by the terms of the Order from making any contribution to the rates this year, recommended that £20,000 of the disposable surplus be transferred to the reserve fund, and that the balance of £48,020 be carried forward to next year.

Councillor CLEVERLEY, in moving the adoption of the report, reviewed the work of the department, and said it was pleasing to notice that there was an increase in the sales of gas of 64 million c.ft., equal to 4·23 p.ct. more than the previous year. The number of consumers had increased by 525, making the present number in the area of supply 35,243, of which 24,994 were prepayment. During the year, 498 cookers had been fixed; making a total on hire of 30,383. The total mileage of gas-mains was now 176¼. The accounts showed decreases of £1228 in salaries, £20,711 in wages, £6133 in repairs, renewals, and refixing of meters and cookers; while there was a reduction of £1221 for public lighting expenses, due to the saving effected by installing clockwork controllers. This reduction had been handed to the ratepayers by decreasing the charges for street lamps. The bad debts amounted to £41, compared with £21 last year; but, considering the trade depression in the early part of the year, this could not be considered an unduly high figure, particularly having regard to the total sales of the undertaking, which amounted to £419,749. In consequence of the reductions made in the price, there was a decrease in receipts from sales of gas amounting to £34,960. There was a net decrease of £16,734 in receipts from residuals. Ammonia and other products showed an increase of £7166. Turning to the profit and loss account, he said, it would be seen that the gross profit brought from the revenue account was £139,992, which was £68,863 more than last year. The charges for interest and sinking fund amounted to £4166 extra, principally due to additional capital raised for the extension at the Foleshill gas-works. The net profit, after meeting capital charges and income-tax, was £87,462; being an increase of £60,589, compared with the previous year. There was a reduction of £15,291 in the amount spent on new meters, stoves, public lamps, and extensions of gas mains, partly due to the reduced cost of labour and materials, but also because fewer meters and cookers were fixed, and in the previous year the new mains laid were of larger size and included the greater part of the 18-in. trunk main to Stoke. During the year, £81,496 had been spent in new buildings and manufacturing plant at the Foleshill works, of which £50,000 had been charged to revenue.

Councillor WALE criticized the allocation of the surplus at some length, maintaining that greater concessions might have been given to consumers in the way of further reduced charges.

The report was agreed to, and the recommendation duly carried.

Councillor CLEVERLEY later moved a recommendation of the Committee that the price of gas be reduced by 3d. per 1000 c.ft. to the smaller consumers, and a slightly less reduction to large users.

Councillor WALE moved the reference back of the proposal, on the ground that, considering the financial position of the gas department, the scale reductions proposed were insufficient.

This was eventually carried by 22 votes to 18.

Messrs. Gibbons (Dudley), Limited.—The Directors of this firm have declared interim dividends on the preference and ordinary shares of 7 p.ct. per annum, free of income-tax, for the six months ended June 30, payable July 1.

The Price of Gas at Liverpool.—The price of gas in Liverpool is to be reduced from the end of this month to 7·8d. per therm. The Gas Company state there is to be an almost immediate resumption of the facilities, abandoned during the war, of hiring gas-stoves. The penny-in-the-slot meter is also to be obtainable again.

Cheaper Gas at Tynemouth.—The Directors of the Tynemouth Gas Company have given notice that the price of gas throughout their area will be reduced by 1d. per therm, equivalent to 4·7d. per 1000 c.ft., from and after the present reading of the meters. The reduction will, therefore, take effect on accounts for the September quarter.

Benzole and Bye-Products, Ltd.—The accounts for the year ended March 31 show a trading loss of £44,494. Deducting the sum of £7201 brought forward, and £8000 written-back from income-tax, &c., there remains a net loss of £29,293 to be carried forward. The assets decreased in this period by £55,963, mainly through a reduction in stock-in-trade of £35,746. A settlement of the claim on the Coal Mines Department was effected, leaving £14,389 due to the Company, which has since been received.

Gas Exhibition at Padiham.—A gas-appliance exhibition was opened at the Co-operative Hall, Padiham, last Monday week. It has been organized by several well-known appliance makers, in conjunction with the Padiham Gas Department. The opening ceremony was performed by Councillor Dr. Mackenzie, J.P. (Chairman of the Padiham Council); and Councillor J. W. Wilkinson (Chairman of the Gas Committee) presided. Councillor Mackenzie stated that there were 4300 consumers of gas in Padiham, but there was still room for an extension of the use of gas for domestic and trade purposes. Councillor Wiggins (Ex-Chairman of the Gas Committee) said they hoped to be able to bring down the price of gas to 2s. 6d. per 1000 c.ft. when the new carbonizing plant was installed. Mr. Ames, the Gas Engineer, emphasized the fact that the use of gas obviated smoke.

BRADFORD CORPORATION GAS REPORT.

In his report to the Gas Committee of the Bradford Corporation on the working of the department for the year ended March 31, Mr. Charles Wood (the Engineer and Manager) says the financial statement, prepared by the City Treasurer, shows that the gross income for the year amounted to £549,917, and the expenditure to £452,313—a gross profit of £97,604. The following charges had to be met: Interest on loans, £41,855; contribution to sinking fund, £18,245; and income-tax, £12,203—leaving a profit of £25,301.

In comparison with the figures for the preceding year, the gross income is reduced by £90,860; the gross expenditure by £111,917; the charges for interest on loans, sinking fund, and income-tax by £4119; and the net profit is £25,301, as against £124 last year. When compared with the year 1914, the gross income and the gross expenditure show a similar increase of 67 p.ct. By the transfer of the net profit, the net revenue appropriation account now has a credit balance of £17,244. During the year, £1764 has been spent at the chemical works on capital account, increasing the total expenditure on this account to £1,296,821. Of this amount, £603,517 remains outstanding; £693,304 having been provided for redemption of loans.

Sales of gas yielded £358,826, or £71,265 less than the previous year. The decreased receipts are chiefly attributable to the reduction of 10d. per 1000 c.ft., which operated from July 1, 1922, and varied the revenue per 1000 c.ft. sold from 4s. 5·953d. in 1922 to 3s. 9·776d. at the present time. The sales of gas for the year show a decrease of 31,850,000 c.ft., or 1·66 p.ct. less than last year; the yearly total being 1,881,289,000 c.ft., as compared with 1,913,139,000 c.ft. in 1922. The decrease in sales is regrettable, but taking into account the abnormally mild weather during the winter, and the general condition of the local industries, the figures may be regarded as satisfactory.

The quantity of gas made was 2,047,460,000 c.ft., as compared with 2,094,242,000 c.ft. during the preceding year; being a decrease of 46,782,000 c.ft., or 2·23 p.ct. The make per ton of coal carbonized shows a slight reduction on last year's record figure, being 13,602 c.ft.; but the standard of quality has been substantially improved.

The markets for residuals have been variable throughout the year; and the total receipts under this head are £125,024, or £13,886 less than last year. The receipts for coke (including breeze), after deducting handling and carting costs, were £70,162, or £33,823 less; the average price realized per ton being 19s. 4·64d., as against 32s. 2·89d. last year. The selling price was reduced five times during the year. The quantity produced for sale was 72,379 tons; the yield per ton of coal carbonized (9·61 cwt.) being better than the previous year. From an analysis of the sales, it is found that 11 p.ct. of the total was supplied to private houses, 33 p.ct. to Corporation departments, schools, churches, &c., and 56 p.ct. for trade purposes; a small quantity sold for export being included under the latter heading. The receipts for tar show an improvement on the previous year; being £37,002, compared with £18,085. The production was 8117 tons, or 10·51 gallons per ton of coal; and the average price realized per ton was 9ls. 2·04d., against 44s. 5·42d. last year. The revenue from ammoniacal liquor was £8994, or £1314 more than last year; the average price realized per ton being 8s. 3 60d.—1s. 3d. per ton more than in 1922. The receipts for spent oxide show an increase of £549; and the gross profit on the chemical works is £8866, compared with £9479 in 1922.

The expenditure on coal has decreased by £67,889; the total cost of the quantity carbonized (including carriage and handling charges) being £187,079, against £254,968 last year. The item for repairs and maintenance of works and plant requited £73,465, or £17,319 less than the previous year. In addition to the ordinary summer overhaul, to bring the plant to the usual standard of efficiency prior to meeting the winter demand, it was necessary for extensive repairs to be undertaken on a section of the vertical plant at the Thornton Road works which had been in continuous use for a long period. Other substantial expenditure included the replacement of two old boilers, and the installation of weighing machines capable of dealing with heavy motor traffic. The capital expenditure on plant during the year was in connection with the erection of three Mills Packard acid chambers at the chemical works. Repairs and maintenance of mains and services, which include new mains and new services, have taken £23,983, or £4199 less than during 1922; and the whole cost has again been charged to revenue account. Other items of expenditure on which decreases are shown include: Carbonizing wages, £12,379 less; meter inspection, £829 less; salaries, £2137 less; printing and stationery, £386 less; and rates and taxes, by reason of the reduction of the poundage, show a decrease of £4028. Wages of employees are an important factor in many of the foregoing items of expenditure. The total wages bill for the year was £162,043, or £41,872 less than that of 1922.

The total expenditure on street lighting was £58,930, or £8940 less than in 1922. Towards the cost, the Finance Committee have provided £54,189. The quantity of gas used was 129,612,000 c.ft., or an increase of approximately 5 million c.ft. on the previous year. The sales through the Darley Street showrooms continue to be satisfactory; but, as a consequence of further reductions in the prices of all classes of appliances, the income shows a decrease on previous figures. The net cost of this branch of the department is slightly higher than for last year.

Mr. Wood thinks that the Committee are entitled to congratulation upon the results achieved during the period.

Cheaper Gas at Deal and Walmer.—The Directors of the Deal and Walmer Gas Company announce a reduction of 1d. per therm—from 1s. to 11d.—in the price of gas, to take effect from the June readings of the meters.

Bridlington Corporation and the Gas Company.—At a recent meeting of the Bridlington Town Council, a resolution was carried, by a majority of five, that the Corporation do not proceed further with negotiations for the suggested purchase of the undertaking of the Bridlington Gas Company.

CHEAPER GAS AT HEREFORD.

Interesting figures in connection with the Hereford Gas-Works were given by Alderman Witts, at a meeting of the Town Council last week.

Referring to the accounts for the year ended March 25, Alderman Witts stated that in 1921-22 a loss was experienced of £1049, and that for 1922-23 a gross profit was made of £4834, there being a net balance of £4176. The assets were something over a quarter-of-a-million pounds, and loans and credits amounted to £57,000. It should be stated that £30,000 of this had been spent during the past two years in the erection of new plant. It could fairly be claimed that the works were in a perfect condition. The reduction of 6d. per 1000 c.ft. in the price of gas meant in the year a loss of £5000; but this would partly be made good by the use of the water-gas plant recently laid down, and the economy effected in the use of coal, amounting to something like £4500. The works also got a rebate from the Revenue officials of £1072, and would in future receive from this source an allowance of between £600 and £700 per annum. He hoped that there would be no opposition to the proposed increase of salary of the Gas Manager (Mr. A. Roberts), who was appointed Acting Manager some nine years ago, after being articled to Mr. Townsend. The make of gas when Mr. Roberts was first appointed Acting Manager in 1915 was 160 million c.ft. per annum, while to-day it was 192 millions. The revenue in 1915 amounted to £22,000, in comparison with £42,000 last year.

Seconding the adoption of the report, Mr. Allcock associated himself with the remarks made concerning Mr. Roberts. The Gas Committee recommended that the price of gas should be reduced from June 24 from 4s. 6d. to 4s. per 1000 c.ft.

SMETHWICK GAS UNDERTAKING.

Mr. E. Hardiker, Engineer and Manager of the Smethwick Gas-Works has submitted his report for the year ended March 31. It states that during the year extensive alterations have been made, including the reconstruction of the Woodall-Duckham vertical retorts and the installation of a waste-heat boiler. The old coke-handling system has been replaced by an electric telpher plant, and a new boiler-house has been erected. The water-gas plant has been remodelled; its capacity being approximately doubled. New works stores also have been built. Contracts have been placed for the installation of a set of purifiers complete with oxide-handling plant, &c.; these being in course of erection. The Committee have under careful consideration the erection of a new spiral-guided holder. There is also embodied in this scheme the provision of larger tar and liquor storage wells, and new station governors.

The distribution department has been reorganized, and gas showrooms have been opened. The increased sales of appliances, together with the appreciation met with at the hands of consumers, has fully justified this course. The total quantity of gas sold for the year was 614,317,000 c.ft., an increase of 46,256,000 c.ft., equal to 8·1 p.ct. The average net price for gas sold during the year was 4s. 4·79d. per 1000 c.ft., as against 4s. 10·94d. for the preceding year.

There was a deficit on net revenue account at the commencement of the year of £2265. After debiting loan charges amounting to £12,937, setting aside a reserve for bad debts of £533, and providing £31,923 for special repairs and renewals in connection with the reconstruction at the gas-works, a balance of £1829 remains to be carried forward.

Referring to the presentation of the accounts, which was entrusted to Councillor S. W. B. Stephen, the "Smethwick Telephone" states that this was the outstanding feature of the Council meeting. The Chairman of the Gas Committee mentioned that the scheme for the reconstruction of the gas-works had received full approval. He gave the fullest credit to the Gas Engineer (Mr. E. Hardiker) and his staff.

GAS PROFIT AT WEST BROMWICH.

The annual report and accounts of the West Bromwich gas undertaking were presented to a meeting of the Town Council on Wednesday last.

The report stated that the total capital expenditure on the undertaking amounted to £269,963, towards which provision for redemption had been made to the extent of £211,547, partly by contributions and accumulations of sinking fund instalments, and partly by direct contributions from revenue to meet capital outlay. The net indebtedness on the undertaking amounted to £62,816. The total income for the year on revenue account was £117,379, as compared with £130,014 the previous year. The net income from sales of gas was £78,450, a decrease of £3857. The total quantity of gas sold was 373,237,510 c.ft., an increase of 21,956,354 c.ft. compared with the previous year, equal to 6·25 p.ct. The expenditure on revenue account amounted to £103,481, compared with £125,386 for the previous year. The net cost of manufacture, after deducting the income from residual products, was 2s. 4·25d. per 1000 c.ft. of gas sold, compared with 3s. 3·9d.; while the total cost, inclusive of all expenses and interest and sinking fund charges, was 4s. 1·49d. per 1000 c.ft.

The gross profit for the year carried to net revenue account was £13,898, as compared with £4627 the previous year. After meeting interest and sinking fund charges, there remains a net profit for the year of £3421, compared with a loss of £4196 for the previous year.

Alderman Cox dealt shortly with the accounts, and pointed out that not only had they turned a deficiency into a profit, but that the reductions in the price of gas to consumers had absorbed £10,833.

Reduction in Price at Shrewsbury.—As from the next reading of the meters, the price of gas to ordinary consumers at Shrewsbury will be reduced to 11·8d. per therm, equivalent to 4s. 6½d. per 1000 c.ft.

GAS LIGHT AND COKE COMPANY'S STANDARD PRICE.

London County Council Recommended to take Action.

The Public Control Committee of the London County Council, consequent upon a resolution passed last October, on the motion of Mr. David Davis, that it be referred to the Committee to consider whether the time had arrived for the Council to apply to the Board of Trade to make amending Orders revising the present authorized standard prices of gas, consulted Mr. Arthur Valon, M.Inst.C.E., and have since received his report with regard to the Gas Light and Coke Company.

The Committee regard the figures submitted by Mr. Valon as too technical to include in their report; but they say that, from them, they are satisfied that, in view of the fall in costs since the Board of Trade in 1921 fixed the present standard price of 15·2d. per therm, there is a strong case for a substantial reduction in such standard price. They therefore decided to recommend "That application be made to the Board of Trade, under section 1 (3) of the Gas Regulation Act, 1920, for an Order reducing the standard price applicable to the Gas Light and Coke Company."

They pointed out in their report to the Council that, "in the event of a reduction in the standard price, the immediate effect upon the consumer will perhaps be slight, inasmuch as the Company have on several occasions since 1921 reduced the price of their gas, and are now charging 9·2d. per therm, as against 14d. per therm in 1921. At the same time, the dividend declared on the ordinary stock for the year 1922 was at the rate of £5 4s. p.ct., although, under the existing sliding-scale arrangements, a dividend of £6 10s. 8d. could have been declared for the second half of the year; and it would appear that the financial position of the Company would have permitted such a dividend to be paid. Apparently, therefore, the Company realize that circumstances have altered since the present standard price was fixed."

The report was, at last week's meeting of the Council, adopted without discussion.

HIGHBURY HOSPITAL FIRE.

Ignition of Floor Polish.

The Coroner's inquiry into the circumstances concerning the fire at the Highbury Hospital for army pensioner patients, which resulted in the death of two men, and injury to several others, was held in Birmingham; and a verdict of "Accidental death" was returned. A suggestion was previously put forward that the fire might have been due to a gas-heated water-boiler; but this was proved to be wrong. It was due to the ignition of floor polish.

The ward which was destroyed was described by Mr. Fred. Smith, Administrative Secretary of the hospital. It was a wooden structure, used as an open-air ward. On being apprised of the fire, Mr. Smith said he had all the gas turned off at the main meter. It was customary, as at other hospitals, to polish the ward floors with a proprietary polish. Sometimes it was necessary to thin this with turpsine; and there were instructions that this should be done in the open, though since the inquiry began he had heard suggestions that occasionally the polish had been softened not in the open. There was nothing on the floor-polish tins which suggested that the material was inflammable. Albert Percy Thorpe, orderly in the ward that was destroyed, stated that he went to the stores for floor polish, and returned with a tin half-full, with turpsine added. He put it on the top of the boiler. He explained that the warmth from the boiler melted the polish, and enabled it to absorb the turpsine. Three or four minutes later, he saw smoke coming from the direction of the bathroom, and, rushing back, found flames behind the boiler. He discovered that the tin was on fire. The Coroner showed witness a burned floor-polish tin which had been found in the ruins of the ward, and directed his attention to a small hole in the bottom of the tin. Witness said he thought it was the tin he had put on the stove. He saw the tiny hole now; but he did not know there was such a hole when he was using the tin.

Chief-Inspector Hawkins, of the Coroner's Department, said Messrs. R. J. Rogers and R. G. Marsh had conducted experiments with floor polish on a "Sun" boiler similar to the one in the hospital. These showed that floor polish, if spilled over the surface of the boiler, would give off a volatile vapour, which readily ignited when it approached a flame. An expert witness said that, but for the presence of the hole in the bottom of the tin, Thorpe might have placed it on the stove without special risk.

Grangemouth Gas Undertaking.—Of last year's debit balance of £8000 on the Grangemouth gas undertaking, the Gas Commissioners report that £4470 has been cleared-off in the financial year just concluded. The rate of 5s. 10d. per 1000 c.ft. is to be continued. Gas-cookers will be withdrawn unless a minimum quantity of gas of a value of £4 is consumed during the year.

Empire Trade.—We learn that a new organization, the British Overseas Trade Association, Ltd., has been formed to promote and foster trade within the Empire. The Advisory Committee consists of Lord Ampthill (President), Sir Gilbert Parker, Bart., Sir T. Vansittart Bowater, Bart., and Sir J. Lulham Pound, Bart.; while the Directors are Sir Lawrence Wallace (Chairman), Colonel Sir Alexander Sprot, Bart., Lieut.-Col. W. A. J. O'Meara, and Mr. C. E. Town. The Association offer to British manufacturers a combination of services, comprising propaganda and protection, conceived and organized on practical and up-to-date commercial lines. An outstanding feature will be the regular intensive sales campaigns, conducted personally by Mr. John Chapman (General Manager), and Mr. D. Macmillan Muir (Assistant General Manager), through the various Dominion markets. Full information may be had from the Secretary, British Overseas Trade Association, Ltd., Imperial Buildings, No. 56, Kingsway, London, W.C.2.

STOURBRIDGE GAS DEPARTMENT.

Mr. C. H. Webb, M.Sc., A.M.Inst.C.E., in his eighteenth annual report, states that the sale of gas shows a decrease of about 4,000,000 c.ft., trade having been bad through the whole of the year. The gas unaccounted-for has increased by about ½ p.ct., bringing the figure to 5·52 p.ct. The year has been a very unfortunate one in respect of breakages of mains.

On revenue account, the expenses have decreased owing to reduced production of gas and falling markets in raw material. The income is also reduced, but not proportionately, as the price of gas was not reduced as rapidly as the cost of materials. Continuing, Mr. Webb states that residuals realized about £5300 less, most of this being on coke; sulphate and tar yielding about the same as before. The balance carried forward to profit and loss account was £23,416—an increase of £4868. This balance is subject to income-tax, annual instalments (including vertical-retort loan), expenditure on mains, services, meters, and cookers. After deduction of these items, there remains a surplus for the year of £3853—an increase of £689.

The vertical-retort installation has been worked throughout the year, with very good results; and it is felt that the capital expenditure on this plant has been fully justified.

ELECTRICITY SCHEME FOR DEAL.

In September last the Deal Town Council referred to the Electricity Committee the question of an application for an Electricity Order made by Sir Charles Bright and Partners, Ltd.

In a report submitted by them at the last monthly meeting of the Council, the Committee said it was intended originally that the Order in question should be applied for, and, if obtained, worked under the control of the Eastern Electricity Distributing Corporation; but the promoters explained that Deal being so far away from the headquarters of this Company at Stroud, Lt.-Col. H. W. Woodall, C.I.E., M.Inst.C.E., a Director of Sir Charles Bright and Partners, had decided to finance personally several Electricity Orders in East Anglia, and to provide the necessary capital for working them. It had also been reported to the Council that Sir Charles Bright and Partners desired, prior to depositing the Special Order with the Electricity Commissioners, to discuss the Order with the local authorities concerned, with the object of arranging to meet their views in every way, and obtaining, if possible, an agreed Order; also that, in the event of serious or unreasonable opposition being taken, the promoters would be obliged to abandon the application so far as it related to the particular district that put such opposition forward. The draft Special Order had been received from Messrs. Sharpe, Pritchard and Co., Parliamentary Agents, with a request for the consent of the Council to the making of a Special Order on the application of Sir Charles Bright and Partners, Ltd. The Order provided for a supply of electricity in the boroughs of Deal and Sandwich, the urban district of Walmer, the rural district of Eastry, and the parishes of St. Margaret-at-Cliffe and Ringwould, in the rural district of Dover. Since the draft was submitted, the promoters had also decided to include the rural district of the Isle of Thanet, including Birchington and Westgate. The proposition was to take a supply of electricity in bulk from the Corporation of Dover. The Committee recommended that the desired consent be given.

After some debate it was agreed that each member should have a copy of the report, and that a special meeting of the Council should be held to decide the matter.

At the subsequent meeting of the Council, the matter was fully discussed; and after Mr. Seabrook had satisfactorily explained the various points raised, it was decided to approve the proposed application of Sir Charles Bright and Partners for powers to supply electricity in Deal and district.

New Companies Registered.—Visso Lighting Corporation, with a capital of £500. Manufacturers of gas and electric lamps, mantles, and lighting and heating apparatus. No. 24, Lower Marsh, London, S.E.1.—Wilson, W. F., with a capital of £3000. Gas-meter manufacturers, engineers, &c. No. 1, Grove Street, Ardwick, Manchester.

Wolstanton Gas-Works.—Mr. W. J. Hassan (Chairman of the Gas Committee) stated at a recent meeting of the Wolstanton Urban District Council that the past year had been a very successful one. Since September the price of gas had been reduced by 1s. per 1000 c.ft.; and there had been a profit of between £3000 and £4000. Since the war, the reserve fund in connection with the gas account had been depleted, and this year it had again been exhausted.

Horncastle Gas-Works.—The Horncastle Urban Council decided at a recent meeting to ask the Ministry of Health to institute an inquiry regarding the proposal to obtain official sanction for a loan, in order to equip the gas-works. The existing plant has been condemned as derelict; and the proposal has been made to instal a Tully plant. The Council, however, are placed in a dilemma, resulting from the circumstance that the approval of the Ministry of Health, with its consequent authority to raise a loan, had not been obtained. It was explained by Mr. R. Achurch, Chairman of the Gas Committee, that he had visited the Board of Trade, in company with the Clerk; and they found that in official quarters there was a desire to assist the Council. He thought, therefore, he could safely say that Horncastle would get its new plant in time, and that there would not be darkness during the next winter. He was given to understand that an inquiry would not be necessary; and he suggested, therefore, that they should consider tenders for the work immediately. The Clerk (Mr. R. Chatterton) stated, however, that he had interviewed officials of the Ministry of Health who suggested that, though they would not press for an inquiry, it would be to the town's advantage to have one. When the Council proceeded to deal with the tenders for the work, it was found that they had not been advertised for in accordance with requirement; and consideration of them had, therefore, to be adjourned. The Surveyor was instructed to supervise the estimates for the work.

BAHIA BLANCA GAS COMPANY, LTD.

The report presented at the sixteenth ordinary general meeting of the Company last Wednesday—held in the offices, Dashwood House, New Broad Street, E.C.—stated that the debit balance brought forward from 1921 was £44 331; and to this had to be added the debit balance of revenue account for 1922, £4392—making a total debit balance of £48,723. The price of gas was reduced from 30 c. to 25 c. per cub. metre as from June 1, 1922; and this reduction, combined with increased provision for bad debts and the writing-down of stores no longer fitted for the Company's use, accounted for the increased loss as compared with the previous year. Another factor was the decrease in gas sales. This matter continued to receive the constant attention of the Board and the Local Management. More efficient burners for cooking had been introduced, a canvassing campaign was being conducted, and results were being carefully watched with a view to determining future policy. The new generator mentioned in previous reports was put into use during the year. Some small structural improvements had been effected; and the plant had proved itself to be an efficient addition to the Company's works. In April last, the holders of participating debenture stock passed an extraordinary resolution whereby they agreed that the payment of debenture interest should be dependent upon profits being earned and available for distribution. Conditions in Bahia Blanca during the first part of 1922 were bad; but latterly there had been an improvement, and every effort was being made to take advantage of this better state of affairs.

The CHAIRMAN (Mr. J. M. Macmorran), in moving the adoption of the report and accounts, which was carried, pointed out that the bad debts and amounts written off stores accounted for £2083, or nearly half the loss for the past year. Comparing the revenue account with that for 1921, fuel showed a considerable reduction. This was due partly to cheaper coal, and partly to the decrease in the amount of gas sold. For the latter reason, carbonizing wages were also lower. Purification and maintenance of works were slightly higher. The remaining items, with the exception of management, were very much the same as in the previous year. The item of management in Bahia Blanca was up because of the bad debts and the amounts written off stores; while the increase in London expenses was due to interest charges. Interest on participating debenture stock had not been charged, because the three years during which it was waived did not come to an end till Dec. 31, 1922. With regard to the price of gas, he had told the shareholders in previous years that the settled policy of the Board was to give a highly efficient service at a reasonably low cost. Accordingly, after consultation with Mr. A. M. Hunter (their Manager in Bahia Blanca), it was decided to reduce the price of gas from 30 c. to 25 c. per cub. metre, as from June 1, 1922; and, in addition, as soon as the price of combustibles permitted, the calorific value of the gas was raised. Continuing this policy, after a series of tests, they found a new and improved boiling burner which, after modification by Mr. Hunter, suited their conditions. These burners showed a thermal efficiency of 60 p.ct.; and a number had been put into service, with satisfactory results. In conjunction with these steps, a canvassing campaign was started, and was still being conducted. The competition from cheap oil, the possibility of which he had indicated at a previous meeting, had developed during the year. Though the first cost of installation and the cost of fuel were in favour of oil, in Bahia Blanca they had not yet arrived at that stage where the oil-burning stoves began to wear and leak. When this happened, as it was bound to do, all sorts of troubles would arise. In many cases, the only satisfactory remedy was a new stove. Gas had none of these disadvantages. It beat all its competitors so far as time was concerned, and was cheaper than electricity. The Board were of the opinion that, on balance, it was the best medium for heating and cooking. He had dealt with this point at some length, in order to show their reasons for hoping that the setback in the gas sales was only temporary, and also in order to indicate some of the factors which had to be considered when dealing with these. Recently there had been a considerably improved demand for cooking-stoves, bath-heaters, &c., though to an extent this was bound to be seasonal. As soon as the Directors knew the results for 1922, it became evident that it would not be possible to recommence the payment of debenture interest, which, in the ordinary course of events, would have begun to accrue on Jan. 1 last; and accordingly, after the question had been discussed in all its bearings, the debenture stockholders were called together. The position of affairs was fully explained to them; and, as a result, the payment of debenture interest was now dependent upon profits being earned and available for distribution. To have to take this step was a great disappointment to the Directors; but since the debenture stock was issued they had had one trouble after another to contend with, and none of them could have been foreseen when the debenture stock was issued. Mr. Hunter continued to conduct the business in the most admirable way. Last year he applied for leave of absence; but afterwards, in spite of the fact that he had not been to this country for seventeen years, he cancelled his leave because of the various measures being taken to improve the Company's position. The Directors had, however, persuaded him to reconsider his decision, and made arrangements for the business to be satisfactorily attended to during his absence; and Mr. Hunter was expected to sail from Bahia Blanca immediately. The discussion of a number of problems was being deferred until his arrival. The staff in Bahia Blanca had also worked loyally and well. A cablegram just received stated that prospects generally were more favourable regarding sales and economical production.

Gas for Street Lighting.—The Great Harwood Council have closely considered the question of illuminating the streets with gas or electricity. The Blackburn Electrical Engineer explained to the Council what might be done with regard to electric installation, and Mr. Harrison, Manager of the Accrington District Gas Board, stated the terms on which the Board would undertake street lighting. The Council endorsed a recommendation to continue with gas, and accepted the suggested terms.

SHUNTING AND SIDING RENT CHARGES ON PRIVATE OWNERS' WAGONS STOPPED FOR REPAIRS.

Proposed Commuted Charge.

We have received from Mr. Edwin A. Hart (Secretary and Solicitor to the Standing Joint Committee of the National Council of Coal Traders, the Coal Merchants' Federation of Great Britain, and the Society of Coal Merchants), of Nos. 11 & 12, Coal Exchange, London, E.C., a copy of the following circular-letter on the above subject.

You are doubtless aware that the existing charges made by the railway companies for shunting and siding rent on wagons stopped for repairs are as follows:

One shilling per wagon for shunting in and out in relation to each stoppage.

Sixpence per day per wagon (after the free period of three days) for siding rent from the date of stoppage until release.

We are pleased to inform you that, as a result of negotiations with the railway companies, the general managers have agreed, as an experimental arrangement for twelve months, to accept a commuted charge of one shilling per wagon per annum on the total number of wagons owned by each trader, in lieu of the present charges for shunting and siding rent on wagons stopped for repairs, providing that an assurance is obtained from the wagon owners and trade associations that this arrangement will be applied to at least 90 p.ct. of the privately-owned wagons (including colliery wagons) running on the companies' lines. The commuted charge will not apply to wagons which are owned and used by traders for works purposes or in colliery yards, but strictly to those running on railway companies' lines.

The average yearly charge in relation to shunting and siding rent on crippled wagons has been ascertained, so far as is possible, and is represented by a figure substantially in excess of the commuted charge now agreed upon; and, in addition to the actual saving in money, regard must be given to the heavy cost and considerable trouble involved in maintaining records and settling disputed items. The railway companies are also agreed that their expenses incurred in the maintenance of records, the collection of the charges, and the settlement of disputed items are so heavy as to nullify any benefit that might be derived from the present charges.

The proposal will be carried into effect by each wagon owner entering into an agreement with the railway companies, embodying the terms of settlement. For the purpose of the agreement, the owner, or owners, will be deemed to be the person, or firm, who

(*a*) Is the actual owner, or owners;

(*b*) Is acquiring ownership of the wagons on the deferred-payment system.

Wagons on simple-hire agreements are considered to be the property of the lessor, and not of the tenant.

An assurance has been given by Mr. D. W. Rees (Chairman of the Association of Wagon Repairing Companies) that a proportionate allowance will be made by all wagon repairing companies who are members of his Association to the owner, in all cases where the maintenance rates include the liability for shunting and siding rent charges; due consideration being given to the fact that in some instances haulage charges are also included in the annual payment. This concession is to apply during the period the commuted charge is in operation.

It is considered that the settlement reached represents a saving to the private owner of approximately two shillings per wagon per annum, in addition to the economy effected in clerkage, postage, &c.

In view of the foregoing, the undersigned strongly recommend that the concession be secured by all wagon owners agreeing to the proposal and entering into the agreement with the railway companies, which will shortly be brought to your notice.

JOHN CHARRINGTON, Chairman, Association of Private Owners of Railway Rolling Stock.
D. W. REES, Chairman, Association of Wagon Repairing Companies.
H. CECIL RICKETT, Chairman, Coal Merchants' Federation of Great Britain.
JOSEPH SHAW, Chairman, National Council of Coal Traders.
DUNCAN BAILEY, Chairman, Railway Carriage and Wagon Builders and Financiers Parliamentary Association.
WALTER H. MOGER, Chairman, Society of Coal Merchants.
G. ROSE, Chairman, Standing Joint Committee.
EDWIN A. HART, Secretary and Solicitor, Standing Joint Committee.

In the event of your wishing to come into the scheme, you should at once notify your assent, and give the total number of wagons owned by you, to the following:

(*a*) If you belong to any of the Wagon or Traders' Associations (named at the end of the circular), to the Secretary of such Association.

(*b*) If you do not belong to any such Associations, then to Mr. Edwin A. Hart, Secretary, Standing Joint Committee, Nos. 11 & 12, Coal Exchange, London, E.C. 3.

Abergele Gas Charges.—It is understood that the Abergele Urban Council are bent on fighting the Abergele Gas Company with regard to the present charge of 8s. 4d. per 1000 c.ft. for gas, and will resist the Company's application for powers to keep it at that figure after Aug. 1, when the Order granted to them during the war expires.

Barnsley Gas Prices.—At a recent meeting of the Barnsley (West Riding) Chamber of Commerce, protests were made against the gas prices in the borough. It was resolved to send the correspondence that had passed between the Chamber and the Barnsley Gas Company to the Barnsley Town Council, and to urge them to take steps to bring further pressure on the Company to effect a reduction.

CITY AND GUILDS OF LONDON EXAMINATIONS.

We are now able to complete our record of the questions [see "JOURNAL" for May 9, p. 362] set, in gas and allied subjects, for the last City and Guilds of London Institute Technological Examinations. The maximum number of marks obtainable is affixed to each question. Not more than eight questions were required to be attempted.

GAS SUPPLY.

Examiner: Mr. H. KENDRICK, of Stretford.

GRADE I.

1.—Make full-sized sketches, giving complete dimensions of all parts, of the following 6-in. joints: Turned and bored, Victaulic, and rigid. In what circumstances would you advise their use? Of what materials are the pipes made for which these joints are generally used? (35 marks.)

2.—What are the principal causes of leakage from mains and services? Explain fully the usual methods adopted for localizing a leak on a main and on a service pipe. (30.)

3.—What are the advantages and disadvantages of cast-iron and steel mains? If you had to lay a new main along a road with a peaty subsoil, and another along a road largely composed of filled-in material, which of the two would you adopt in each case? What precautions would be needed to ensure stability and long life? (40.)

4.—Meters are usually described as being equal to so many lights. What does this mean in terms of cubic feet capacity? Does the capacity of meters vary at different pressures? If so, to what extent? (30.)

5.—Sketch in detail a prepayment attachment to an ordinary dry meter, and show how the mechanism automatically shuts-off the gas when the money is exhausted. (35.)

6.—What solders are used in fixing gas apparatus for heating, cooking, and hot-water supply? What are their compositions, and how are they prepared? (30.)

7.—Sketch and describe a mercurial governor suitable for a house supply. Should it be fixed at the inlet or outlet of the meter? Give reasons for your answer, and discuss the necessity for such governors in view of present-day pressure requirements. (30.)

8.—Give a complete list and description of all tools and apparatus required by a gas-fitter engaged in fixing outside shop-window high-pressure gas-lamps. (30.)

9.—State briefly the principles which have to be considered when constructing a weather-proof lantern for exterior lighting. Sketch in detail a modern weather-proof lantern suitable for street lighting, and one for outside shop-window lighting. (35.)

10.—Why is it important that flues must be utilized when fitting geysers in bathrooms or other confined places? State your reasons. Sketch and describe a geyser for supplying hot water to a bath, and show the necessary gas and water pipes and flue connections. (40.)

11.—What are the relative efficiencies of the following burners when consuming 4 c.ft. per hour of 475 B.Th.U. gas at 25-10ths pressure: (*a*) Bray's 07 "C" burner; (*b*) Sugg's preheated inverted burners with multiple nozzles; (*c*) Bland inverted burner; (*d*) Kern burner? What regulations to gas and air inlets may be necessary to ensure maximum illuminating power (i.) with a straight coal gas, and (ii.) with a mixture of coal gas and water gas? (35.)

FINAL.

1.—(*a*) State in general terms the regulations in the Gas-Works Clauses Act, 1847, governing the powers of a gas undertaking to break-up streets for the purpose of laying mains. Do these apply to both authorized and unauthorized undertakings; and if not, how do the powers of the two differ? (40 marks.)

or

(*b*) What are the main faults of brass meter-cocks as often used for service work? Describe and sketch in elevation and cross section a 1-in. main cock of the best type. What is the composition of the metal most suitable for the purpose that will give a smooth and true surface to the wearing parts and offer a high resistance to corrosion? (30.)

2.—(*a*) State briefly the regulations made by the Board of Trade under the Gas Regulation Act, 1920, for testing meters for soundness, registration, capacity, and excessive absorption of pressure. (40.)

or

(*b*) For what purpose were the new "standard" gas-meters introduced? How do they differ from the older type? What advantages do you anticipate from their general adoption by gas undertakings? (35.)

3.—(*a*) In determining the carrying capacity of a low-pressure gas-main, Pole's formula is generally used. Is this quite correct? State the possible sources of error. What influences have bends and right-angled branches on the flow of gas through a main? What corrections, if any, have to be made in all the above circumstances to determine the actual quantity of gas discharged? (35.)

or

(*b*) Which of the following types of meters would you instal in sitting and bed rooms of hotels and boarding establishments fitted for gaseous heating: (i.) Discount rotary meters; (ii.) Thorp's taxi-meters; (iii.) cabinet prepayment meters; (iv.) cabinet stop meters? Give a brief description of each, and state their advantages and disadvantages in use. (30.)

4.—(*a*) In what way does the formula used in calculating the capacity of high-pressure gas-mains differ from Pole's formula for low-pressure gas-mains? Give details. What is the carrying capacity in c.ft. per hour of a 3-in. H.P. solid-drawn steel main, two miles in length and practically straight, when the pressure drops from 10 lbs. to 5 lbs. per sq. in.? Sp. gr. of gas, 0·55. Use Prof. Unwin's formula for the calculation. (35.)

or

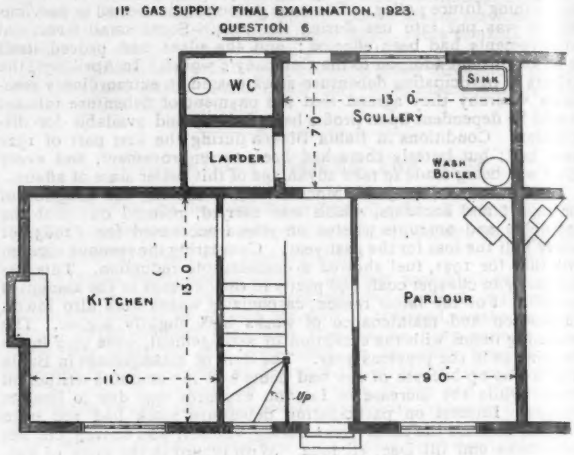
(*b*) Which do you prefer, the "N.G.C." standard cooker, the sealed oven cooker, or the old type cooker? State your reasons. Which of the following burners would you prefer to fit on the cooker hotplate, and why: (i.) The "Pleno" burner; (ii.) the ring burner; (iii.) the "N.G.C." standard burner; (iv.) the disk burner? (30.)

5.—(*a*) State what you know about spun-concrete and cast-iron pipes. How are they made? What are their advantages and disadvantages for gas distribution purposes? (35.)

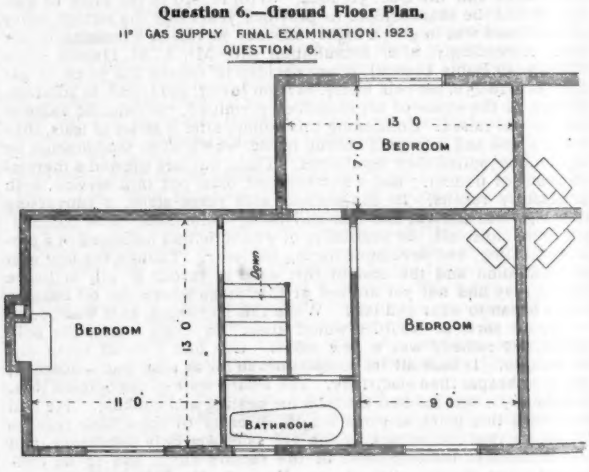
or

(*b*) Some of the most successful illuminated signs are of the flashing order. Can these be supplied with gas as the lighting medium? Give a detailed description and sketch of any with which you may be acquainted. (30.)

6.—Write a brief specification, stating sizes of pipes, fittings, and apparatus for an all-gas cottage, the plans of which are shown on the plate attached to this paper. (40.)



Question 6.—Ground Floor Plan.



FIRST FLOOR PLAN

Question 6.—First Floor Plan.

7.—Many houses of the older type carcassed forty or fifty years ago present great difficulties when modern requirements in regard to gas supply have to be grafted on to the old pipe systems. How is this? What would be necessary to be done to give an adequate supply—

(i.) If the lighting is modernized;
(ii.) If cooking stoves and water heating are fixed;
(iii.) If gaseous heating is introduced throughout;
(iv.) If it is converted into an all-gas house with modern gas lighting. State details of necessary alterations. (35.)

8.—What do you understand by "spraying" meters? What effect has spraying on the meter parts and on registration? Is the effect permanent, and will it have any detrimental effect on the materials of which the meters are constructed? (30.)

9.—What is the general effect of colour on the illumination of interiors? It is desirable to light all the rooms of a block of buildings to the same degree of intensity; how can this be done when the rooms are respectively decorated and furnished as follows:

(1) Ceilings and walls light, floors dark;
(2) Ceilings and floor light, walls dark;
(3) Ceilings light, walls and floor dark? (35.)

10.—What advantages accrue to a gas undertaking and to consumers when a maintenance department for burners and all apparatus is installed? Briefly describe any such system in actual working that you may be acquainted with. What is the minimum number of visits permissible per annum, with due regard to efficiency and economy? Would you advise house-to-house calls at stated intervals, or depend entirely on consumers' complaints? State your reasons. (35.)

11.—Discuss each of the following, stating advantages and disadvantages:

(i.) Single, duplex, and triplex burners for gas-fires;
(ii.) Serrations *v.* holes in nipple adjustment;
(iii.) Straight or curved fronts for gas-fires;
(iv.) Self-contained *v.* inset fires. (35.)

LOCAL AUTHORITY GAS ADMINISTRATION.

A Statement Made by the Board of Trade.

In connection with the Royal Commission on Local Government now sitting, the Board of Trade have submitted a statement as to the origin and development of local authorities in relation to gas administration.

In the first place, the document refers back to various private Acts of Parliament dating from 1823, whereby town councils and urban district councils, or their predecessors, have been authorized either to establish a gas undertaking or to acquire an undertaking already supplying gas within the limits of their jurisdiction. Reference is made to the general Acts under which local authorities also operate in connection with gas manufacture and distribution. Section 161 of the Public Health Act, 1875, is specially referred to, together with other general Acts, till we come to the Gas Regulation Act of 1920. The procedure connected with this is also alluded to. It is pointed out that this procedure has in effect superseded the procedure under the Gas and Water Works Facilities Act, 1870, so far as gas is concerned. This Act has not, however, been repealed. In 1882, the first year in respect of which returns were issued by the Board of Trade, there were 120 local authorities owning gas undertakings. At the present time, the number is 246, comprising 38 county borough councils, 73 borough councils, 127 urban district councils, 6 joint gas boards, and 2 rural district councils. The two rural district councils referred to have been given urban powers for this purpose by the Ministry of Health.

The next section of the document deals with the functions of existing local authorities in respect of their gas undertakings; and it then proceeds to state that six joint boards have been established by Act of Parliament for carrying on gas undertakings within areas covering the districts of several local authorities. The authorities within the limits of supply of these boards elect persons to serve on the boards.

Provision is made in section 4 of the Gas Regulation Act, 1920, for the joint appointment of a gas examiner by any number of local authorities or for a county council to appoint with the consent of any other local authority interested.

The next section deals with the finance of local authorities; and this is succeeded by an allusion to their central supervision. With the exception of matters relating to loans and audit, the central supervision of gas undertakings of local authorities now rests with the Board of Trade; but this supervision is limited in extent, being confined largely to matters which may be raised in connection with applications by the local authorities for further powers.

Under section 1 of the Gas Regulation Act, 1920, the Board have power to revise the maximum price of gas fixed by the Acts or Orders relating to a local authority's undertaking; and, by sections 5 and 6 of this Act, the Gas Referees and Chief Gas Examiner appointed by the Board have powers in connection with the testing of the gas supplied. If the Chief Gas Examiner reports that a local authority has not maintained the calorific power which they have undertaken to supply, and that, in consequence, the revenue of their undertaking in any quarter is improperly increased, the Board of Trade are required to satisfy themselves that the amount so obtained is returned to the consumers by a reduction in the price of gas in the next or some succeeding quarter.

A paragraph appears which states that county councils have no general powers of supervision or control over the gas undertakings of other local authorities. It may be mentioned, however, that in 1889 the Local Government Board made a Provisional Order, under section 10 of the Local Government Act, 1888, transferring to the county councils the powers of the Local Government Board and Board of Trade under the Gas and Water Works Facilities Acts, and the Public Health Act in 1875; but the Provisional Order was not confirmed by Parliament.

Silsden Gas Price Reduction.—The Silsden District Council last week agreed to reduce the price of gas by 5d. per 1000 c.ft., bringing the price down to 5s. Special discounts to large consumers were increased from 2½ to 5 p.ct., and from 5 to 10 p.ct.

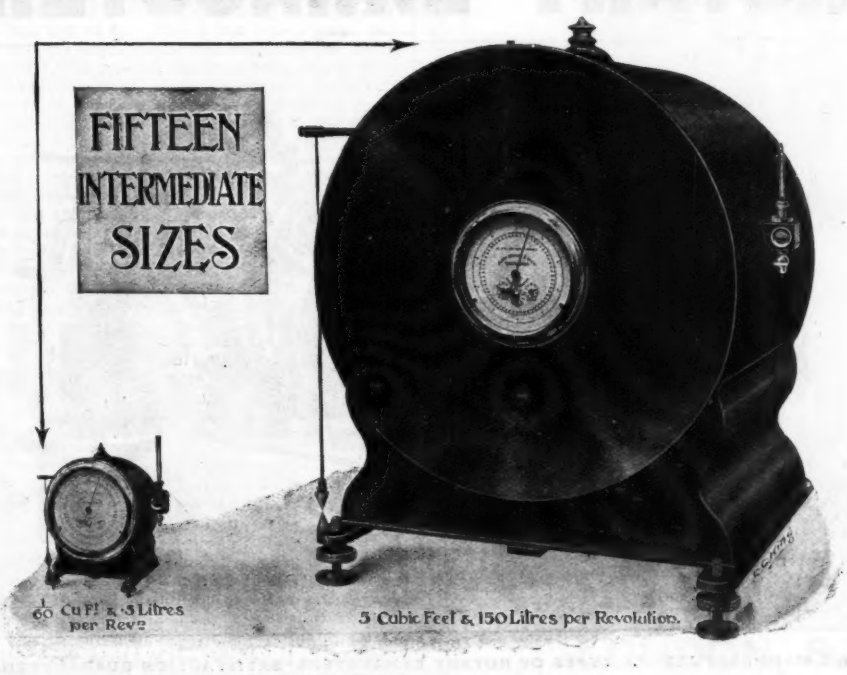
Price Reduced at Sowerby Bridge.—At their last monthly meeting, the Sowerby Bridge District Council decided that the price of gas should be immediately reduced. For consumers resident within the Council area, the price was fixed at 3s. 3d. per 1000 c.ft., and for those outside the boundary the price was reduced from 4s. to 3s. 9d. per 1000 c.ft. In addition, the usual 10 p.ct. discounts will operate.

Wandsworth, Wimbledon, and Epsom District Gas Company.—The Directors of this Company have decided to increase the dividend on all classes of the capital stocks of the Company governed by the sliding scale by two points, which is an equivalent of 3s. 6d. p.ct. per annum on the new ordinary stock and the Wandsworth "C" stock, and 5s. p.ct. on the other classes of stock. Dividends to June 30 at the increased rates will be paid on Aug. 15.

Gas Poisoning.—At the Liverpool Coroner's Court last week, a verdict of "Accidental death" was returned on the body of a two-months-old child named Knight. It was stated that the parents had retired for the night leaving the gas burning. During the night the gas supply ceased from the prepayment meter; but when the father rose in the morning, he did not turn the tap off. When downstairs, he placed another penny in the meter. On wakening, Mrs. Knight found her child dead.

Belfast's Record Gas Year.—On the minutes of the Gas Committee presented to the Belfast Corporation last week, Mr. M'Laurin remarked that the year recently closed had been the most successful in the history of the undertaking. The year 1913 was successful, when the gross profits were £75,000. This year the gross profits amounted to £142,377; and after wiping out a deficit of £16,000, paying £6000 for capital loan, and clearing all sinking fund charges, the net profit amounted to £24,796. The minutes were adopted.

LABORATORY METERS.



ALEXANDER WRIGHT & CO., LTD.,

Telegrams: Precision, Vic.

WESTMINSTER.

Telephone: Victoria 1207.

THE NORTH-EAST COAST COAL TRADE.

From Our Own Correspondent.

Following on the disorganization of the Race holidays, the Newcastle market has had another very unsettling week. Everything this week has been Royal Show, with business very much in the background. The only occasion on which members really thronged the Exchange was on Thursday morning, when the Prince of Wales received a great ovation from a large assembly, and, to the delight of all, made a speech.

After a fortnight of holiday and gaiety, it will be interesting to see how the market settles down. It cannot at present be described as anything but weak for prompt, and supplies have been readily obtainable all the week for this month's shipment, with no one apparently wanting to buy. Best quality gas has been on offer direct at 28s., and at 27s. through second-hand holders. No doubt the latter still have supplies for this month which they are anxious to clear.

June and July are usually looked upon as slack months, but there has been sufficient inquiry for export from all quarters to maintain optimism among colliery fitters for next month onward. For that position the market is firm, and collieries all maintain that they are already well sold. Whereas, for prompt shipment, Wear Specials would probably discount their quotations of 30s., and best quality gas the 29s. to 30s. which they are asking, these prices are firmly held for August and all forward business.

At the end of the week, further inquiry has come on to the market for prompt shipment to Australia. Should any business materialize, it will help considerably to hold-up the present rather weak market.

COAL TRADE IN THE MIDLANDS.

From Our Local Correspondent.

The market shows a distinctly easier tendency, the seasonal drop in consumption outweighing the small increase in miners' wages. As regards gas coal, some of the less important undertakings are still putting off completion of the new contracts. Where there is ample storage capacity, the stocks in hand are sufficient to enable engineers to carry on for a while. They have no fear of prices going against them. On the other hand, the impression prevails that more favourable terms may be obtainable before it becomes necessary to replenish. In a few cases annual contracts do not expire till the end of August. With the advent of the long-delayed summer, purchases against domestic consumption have fallen off appreciably. Along with this displacement comes a decline in the industrial demand, both at home and abroad. Collieries show rather more anxiety to place their output, though it is only here and there that quotations are noticeably affected.

Collieries are no longer in the strong position they maintained up to a month or so ago. They are faced with a lessened production by the blast-furnaces. Smelters declare that unless they can produce cheaper there is no possibility of carrying on at the present rate of output, as it is a losing proposition. Nevertheless, coke suppliers are not disposed to entertain offers which are made to them of 25s. at ovens. The export demand has shrunk, and the fancy prices of a short time ago are not now being paid by Continental industrialists. Collieries are, however, still able to command substantially higher prices for export than they can get at home; and this is moderating the fall.

YORKSHIRE AND LANCASHIRE COAL TRADE.

From a Local Correspondent.

Prices for gas coal in Yorkshire and Lancashire have been increased, and are being paid by consumers to the maximum extent of 1s. 6d. per ton.

Industrially, the market is rather weaker, though, in view of the recent advance in miners' wages, collieries are inclined to increase their figures from 1s. to 1s. 6d. per ton.

The iron and steel industries report a decided falling-off in commodities, and are desirous of obtaining coke at considerably lower figures than now operate. The general opinion has been that 30s. per ton at the ovens was a fair price; but there are cases where large ironworks cannot now pay more than 25s. delivered at their own plant.

There appear to be more inquiries for export, particularly in regard to gas coke; but for the ordinary descriptions of export coal there is no improvement.

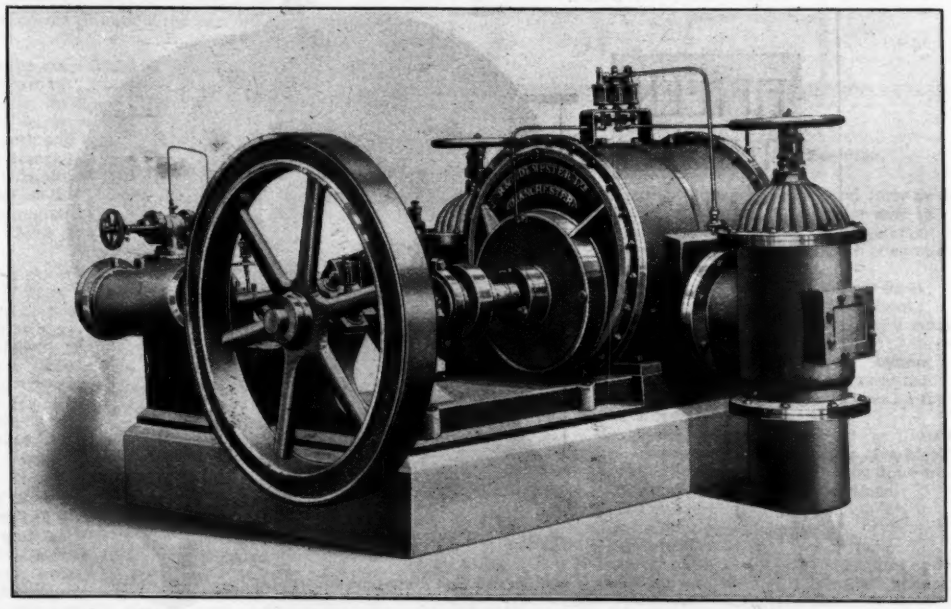
House coal is not in urgent demand, though some collieries, in view of the warmer weather, are reducing prices for stocking purposes in regard to the best descriptions of fuel. Secondary qualities remain firm.

A reduction in the charge for gas at Poulton came into force on July 1. The price has been lowered by 7d. per 1000 c.ft., making it now 4s. 11d.

For the 1923-24 lighting season, big reductions have been made by the Volker Lighting Corporation in the price of the incandescent mantles they manufacture. A new list has been issued, and is being sent to all customers. Other members of the trade are invited to make application for copies to the Volker Lighting Corporation, 57, Garratt Lane, Wandsworth, S.W. 18.

There was an interesting gathering last Wednesday week in the large messroom of the Luton Gas-Works, presided over by Mr. William Phillips (the Engineer and Manager to the Company), who congratulated the men on the way they had taken up ambulance work, and expressed himself as gratified with the result of the examination. This showed that 21 had qualified for the first-aid certificate of the St. John Ambulance Association, and one had gained the medallion. Dr. W. Archibald presented the certificates.

ROTARY EXHAUSTERS



WE MANUFACTURE ALL TYPES OF ROTARY EXHAUSTERS—SATISFACTION GUARANTEED.

R. & J. DEMPSTER, LTD., MANCHESTER.

LONDON OFFICE: 34, VICTORIA STREET, WESTMINSTER, S.W. 1.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *July* 9.

The recent fine weather has caused a considerable increase in the demand for tar for road purposes, and much larger quantities are being delivered. There has also been considerable inquiry for pitch during the past week, and the price is now firmer at not less than 150s. per ton f.o.b. makers' works. Creosote remains steady at 10d. to 10½d. per gallon; but other products in the London market are quiet and unchanged.

Tar Products in the Provinces.

July 9.

The market for pitch has been steady throughout the past week, and has to a slight extent still further improved. There is a fair amount of inquiry; but at present buyers seem to be rather nervous of the sudden rise. Creosote is still very firm, and there does not appear to be very much stock. Refined products are still quiet, with little or no business doing. Refined tar is in very good demand, and supplies are moving off more freely now that the weather is better.

The average values for gas-works products during last week were: Gas-works coal tar, 83s. 6d. to 88s. 6d. Pitch, East Coast, 137s. 6d. to 142s. 6d. f.o.b. West Coast—Manchester, 135s. to 140s.; Liverpool, 136s. to 141s.; Clyde, 136s. to 141s. Benzole 90 p.ct., North, 1s. 5½d. to 1s. 6½d.; crude 65 p.ct. at 120° C., 11½d. to 1s. naked at makers' works; 50-90 p.ct., naked, North, 1s. 7d. to 1s. 7½d. Toluole, naked, North, 1s. 7d. to 1s. 8d. nominal. Coal tar crude naphtha in bulk, North, 8d. to 8½d. Solvent naphtha, naked, North, 1s. 3½d. to 1s. 5d. Heavy naphtha, North, 1s. 5½d. to 1s. 7½d. Creosote, in bulk, North, liquid, 8d. to 8½d.; salty, 7½d. to 8d.; Scotland, 6¾d. to 7¼d. Heavy oils, in bulk, North, 8½d. to 9d. Carbolic acid, 60 p.ct., 3s. 4d. to 3s. 5d. prompt. Naphthalene, £15 to £16; salts, £6 to £8, bags included. Anthracene, "A" quality, 4d. per minimum 40 p.ct., purely nominal; "B" unsaleable.

Manchester District Tar Prices.

The average price realized for the sale of tar in the Manchester district, according to the sliding-scale, for the month of May, was £5 4s. 0·58d. per ton.

TRADE NOTES.

A New Industry for Tees Side.

Messrs. Cochrane & Co., Ltd., of Ormesby Iron-Works, Middlesbrough, have just secured an order from the Aberdeen Corporation for the supply and delivery of 3 miles of 48 in. diameter cast-iron pipes, lined centrifugally throughout with 1 in. thickness of concrete. Messrs. Cochrane recently acquired the sole rights in the United Kingdom and Ireland, and other countries, for the manufacture of concrete pipes by the mechanical centrifugal process known as the "Vianini" system, which is also adaptable for the lining with concrete of cast-iron, steel, and other classes of piping. This system, we learn, has been tried-out and proved very satisfactory on the Continent; one of the important installations being the Apulia water scheme in Italy, involving about 80 miles of concrete pipes from 6 in. to 32 in. diameter, laid down so long ago as 1913, which has been a great success. The "Vianini" process being eminently adaptable for lining cast-iron pipes with concrete, and pipes of this description being specified by the Aberdeen Water Engineer, Messrs. Cochrane have very materially reduced the cost to the Corporation by undertaking to do the necessary concrete lining of their cast-iron pipes on the site of the pipe-track in the vicinity of Aberdeen, thus taking advantage of the large savings in railway carriage on the many tons of concrete which will be required. Messrs. Cochrane's plant for demonstration purposes and ordinary commercial requirements is situated at their works in Middlesbrough, where they are installing apparatus to produce plain and reinforced concrete pipes with spigot and socket joints from 3 in. to 70 in. diameter, up to 12 ft. long. We understand the firm are prepared, for important pipe schemes, either wholly concrete or cast-iron lined with concrete, to instal a plant on the site of any proposed works, thus taking advantage of local supplies of materials and unemployed labour.

Dempster-Toogood Installation at Swindon.

This remarkable plant, mention of which was made in the "JOURNAL" last week, has been designed with adequate provision for any future extension; the whole of the auxiliary plant being grouped at one end, and a free yard space being left at the other end of the carbonizing plant. A new carbonizing plant may be added without new handling plant being required. The latter is capable of dealing with 100 tons of coal per hour, and 50 tons of coke. The power for the plant consists of three electric generators driven by three gas-engines, each of 75 H.P.

The Ramie Company, of Bredbury, announce substantial reductions in the price of their well-known "Zeimar" mantles. Full particulars of the new prices can be obtained from the Ramie Company, Bredbury, near Stockport.

A fire occurred in the bye-products department at the Middleton Colliery, near Leeds, last week, owing to the bursting of a tank which was receiving hot pitch. The pitch took fire, and blazed fiercely. Two Leeds fire engines attended, and quickly extinguished the flames.

The Halifax Gas Committee have approved a scheme of the Gas Engineer (Mr. W. B. M'Lusky) for supplying gas to the houses of the Sandbeds Corporation housing scheme. This includes the laying of 563 yards of main, provision of standard meters, cookers, cast-iron mantle registers, and rustless iron gas-pans, at an estimated cost of £1529. A similar scheme has been approved for the Beechwood Road housing estate, at an estimated cost of £1997.

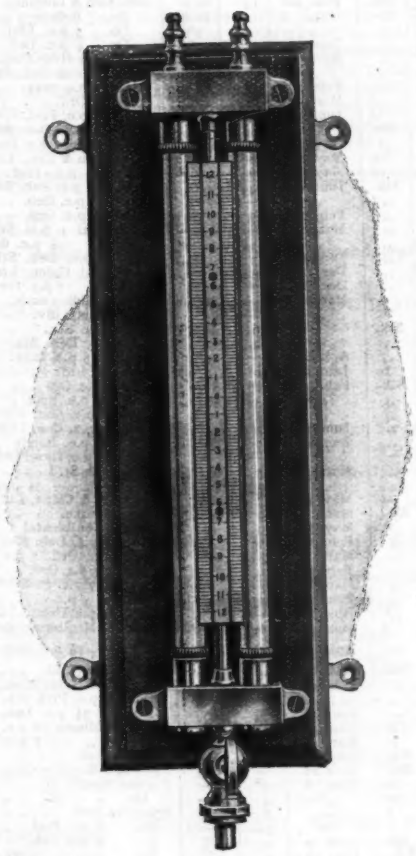
The Victory Prepayment Meter is now advertising itself, so we are bringing to your notice our

GAUGES

All Sizes.

For all Purposes.

Enquiries Solicited.



SAWER & PURVES

MILES PLATTING, MANCHESTER. RADFORD ROAD NOTTINGHAM.

45 & 47, Westminster Bridge Road,
LONDON, S.E.

Telephone Nos. { 3289 (City) MANCHESTER. 2025 (Central) NOTTINGHAM. 2412 (Hop) LONDON.

Wires { "SAWER MANCHESTER." "SAWER NOTTINGHAM." "METRIQUE LAMB LONDON."

STOCK MARKET REPORT.

The Stock Exchange has had an increasingly depressing week, in excess of its immediate predecessors. It started weak, and went from bad to worse; prices everywhere giving way freely, and the gilt-edged luxuries as badly as any. For instance, the big four stood on Friday thus: Consols 56½-58, War Loan 99⅝-100⅜, Funding 88¾-90, Victory 89½-91. Indians and Colonials were similar. Rails, at home and abroad, were quite flat. The Foreign Market, of course, suffered; but French and Russian had a slight recovery.

Business in the Gas Market even was quieter to a degree we must go back many weeks to find equalled; but there was nothing to speak of in the way of depression. One or two foreign undertakings, affected perhaps by Exchange vagaries, were slightly lower; but, *per contra*, some home companies made advances. Thus, Bournemouth debenture rose 5, and South Metropolitan 6½ p.ct. debenture 1. Other movements were Imperial Continental -1, Continental Union -1½, Monte Video -2, Primitiva debenture + 2½, and San Paulo debenture + 1½.

The following transactions in gas during the week were recorded: On Monday, Bombay 5½, Brentford "A" 104, Continental Union 7 p.ct. preference 73, 76, Croydon sliding-scale 105, ditto maximum dividend 84, European 7, Gas Light ordinary 99½, 100, 100¾, 101¼, ditto 3½ p.ct. maximum 67¾, ditto 4 p.ct. preference 82½, ditto 3 p.ct. debenture 62½, 63½, Imperial Continental 161½, 163, ditto 3½ p.ct. debenture 76½, Oriental 98, South Metropolitan 99¾, Cape Town 5 p.ct. debentures 75, 75½. On Tuesday, Bombay 5½, British 12⅝, Commercial 4 p.ct. 98, Gas Light ordinary 99½, 99⅝, 99¾, 100⅛, 100¼, ditto 3½ p.ct. maximum, 67½, ditto 4 p.ct. preference 81⅞, Imperial Continental 3½ p.ct. debenture 77 1/16, South Metropolitan 99, 99¼, 99½, 99¾, Southampton 90, 90½, Chester 5 p.ct. maximum 84, 84½, North Middlesex 5 p.ct. preference 95½, Tottenham 5 p.ct. preference 97½. On Wednesday, Alliance and Dublin 75¼, Brighton and Hove "A" ordinary 133½, 135, European 9, Gas Light ordinary 99½, 99¾, 100, 100¼, ditto 3½ p.ct. maximum 68⅛, ditto 4 p.ct. preference 81½, ditto 3 p.ct. debenture 62⅜, Hong Kong 15½, 15⅝, 15¾, Imperial Continental 161, 162, Monte Video 55, South Metropolitan 99, 99⅛, 99⅜, 99½, Southampton 90⅝, Guildford 76, North Middlesex 5 p.ct. preference 94½, Swansea 5 p.ct. maximum 85½, Wandsworth 3½ p.ct. new issue 103. On Thursday, Aldershot 5 p.ct. maximum 75, ditto 4 p.ct. preference 73½, Alliance and Dublin 75, 75¼, Commercial 4 p.ct. 97, Continental Union 40, Gas Light ordinary 99⅛, 100, ditto 3 p.ct. debenture 63½, Imperial Continental 159, 160, 161, Liverpool 7 p.ct. preference 108½, 109, 109½, Primitiva 5 p.ct. preference 35⅝, South Metropolitan 98½, 98⅜, 99, 99⅛, South Suburban 5 p.ct. debenture 97, 98, Wandsworth Wimbledon 113½, 114. On Friday, Gas Light ordinary 99, 99½, Imperial Continental 158, 159½, South Metropolitan 98½, Tottenham "B" 104.

In the Money Market there was something of a surprise when on Thursday (July 5) the Bank of England rate was advanced to 4 p.ct. [from the 3 p.ct. rate which had endured since July 13 of last year] in spite of the fact that market supplies were abundant. It is outside our province to discuss the *pros* and *cons* of this action, for which we may assume that very good grounds existed. Discount rates advanced accordingly, and silver was higher.

ANTE-WAR PRICES AND DIVIDENDS, LATEST DIVIDENDS, AND LAST WEEK'S TRANSACTIONS.

Issue.	Share.	When ex-Dividend.	Ante-War Dividend & Bonus.	Last Dividend.	NAME.	Closing Prices, July 30, 1914.	Present Prices.	Lowest and Highest Prices of Transactions.
£			p.c.					
131,978	Stk.	Feb. 22	—	5%	Aldershot 5 p.c. max. C.	..	74—79	75
190,492	,,	,,	4	4%	Do. 4 p.c. Pref.	..	72—77	73½
1,551,868	,,	Apl. 5	2½	5%	Alliance & Dublin Ord.	59—64	72—77	75—75¼
374,000	,,	Jan. 11	4	4%	Do. 4 p.c. Deb.	76—79	63—68	..
280,000	5	May 17	7½	4/-	Bombay, Ltd.	5⅛—6⅛	5—5½	5¼—5½
100,000	5	Feb. 22	16	8/-	Bournemouth Gas and Water { 5 p.c.	..	12—13	..
383,110	10	,,	7	7/-	Bournemouth Gas and Water { B 7 p.c.	15—15½	12—13	...
115,000	10	,,	6	6/-	Bournemouth Gas and Water { Pref. 6 p.c.	13½—14	10¼—11¼	...
162,065	—	June 28	—	4%	Bournemouth Gas and Water { 4 p.c. Deb.	..	77—82*	...
992,045	Stk.	Feb. 22	14	6¼/-	Brentford A Consolid.	261—266	102—107	104
734,920	,,	,,	11	6¼/3	Do. B New	204—209	102—107	...
55,000	,,	,,	5	5%	Do. 5 p.c. Pref.	109—111	85—90	...
221,400	,,	June 14	4	4%	Do. 4 p.c. Deb.	91—93	77—82	...
214,775	,,	Mar. 8	11	11%	Brighton & Hove Orig.	208—213	175—180	...
244,200	,,	,,	8	8¼%	Do. A Ord. Stk.	154—159	130—135	133½—135
1,272,500	Stk.	Feb. 22	5	5%	Bristol 5 p.c. max.	..	97—98	..
570,000	20	Mar. 22	12½	10/-	British A Ord.	44—45	12¾—13¼	12¾
10,000	10	June 28	—	7/-	Do. 7 p.c. Pref.	..	11¼—12¾*	...
120,000	Stk.	,,	4	4%	Do. 4 p.c. Deb. Stk.	88—90	74—79*	...
220,335	,,	,,	4	4%	Buenos Aires 4 p.c. Deb.	85—87	56—59*	...
100,000	10	May 17	—	—	Cape Town & Dis., Ltd.	1¾—2¼	6¼—7¾	...
100,000	10	May 3	—	4/6	Do. 4½ p.c. Pref.	4—6	6—7	...
100,000	Stk.	June 28	4½	4½%	Do. 4½ p.c. Deb. Stk.	70—75	70—75*	...
237,860	,,	,,	—	7½%	Cardiff 7½ p.c. Deb.	..	106—111*	...
157,150	,,	Feb. 26	5	5%	Chester 5 p.c. Ord.	108—110	..	..
1,513,280	,,	Mar. 8	5/9/4	60/-	Commercial 4 p.c. Stk.	106—108	97—100	97—98
360,000	,,	,,	5¼	60/-	Do. 3½ p.c. do.	103—105	97—100	..
475,000	,,	June 14	3	3%	Do. 3 p.c. Deb. Stk.	69½—71½	56—61	...
800,000	,,	Dec. 15	4	—	Continental Union, Ltd.	76—79	33—42	40
200,000	,,	Dec. 14	7	4%	Do. 7 p.c. Pref.	115—118	72—77	73—76
660,000		Mar. 8	—	6%	Croydon sliding scale.	..	103—106	103
284,975		,,	—	5%	Do. max. div.	..	83—86	84
492,270	Stk.	—	6	4¼%	Derby Con. Stk.	123—125	..	...
55,000	,,	—	4	4%	Do. Deb. Stk.	102—104	..	...
209,000	,,	Apl. 5	—	5%	East Hull 5 p.c. max.	..	..	...
1,002,180	10	Jan. 23	10	5/0	European, Ltd.	17½—18	8¾—9½	9
16,546,120	Stk.	Feb. 8	4/17/4	52/-	Gas Light { 4 p.c. Ord.	98—102	98½—100½	99—100½
2,600,000	,,	,,	5½	35/-	Gas Light { 3½ p.c. max.	76—79	67—69	67¼—68¼
4,062,235	,,	,,	4	4%	Gas Light { 4 p.c. Con. Pref.	96—99	81—83	81½—82½
4,761,930	,,	June 14	3	3%	Gas Light { 3 p.c. Con. Deb.	72½—74½	61—64	62½—63½
130,000	,,	Dec. 11	10	10%	Coke { 10 p.c. Bonds	..	..	...
	—	—	—	—	Coke { 7½ p.c. Ilford Deb.	..	..	...
82,500	,,	Mar. 8	5	65/7½	Hastings & St. L. 5 p.c.	..	92—97	...
258,740	,,	,,	3½	50/7½	Do. 3½ p.c.	87—89	75—78	...
70,000	10	May 17	11	10%	Hongkong & China, Ltd.	16½—16¾	15—16	15¼—15¾
86,600	Stk.	Mar. 8	9	9¼%	Hornsey 7 p.c.	..	147—152	...
1,976,000	,,	May 31	9	£17	Imperial Continental	150—160	158—163	158—163
404,800	,,	Feb. 8	3½	3½%	Do. 3½ p.c. Deb. Red	84—86	76—78	76¼—77 1/16
235,242	,,	Mar. 8	6¼	6¼%	Lea Bridge Ord. 5 p.c.	119—121	97—102	...
2,498,905	,,	Feb. 26	10	37/6	Liverpool 5 p.c. Ord.	..	..	...
600,000	,,	Mar. 22	—	7%	,, 7 p.c. Pref.	..	107—110	108¼—109½
165,736	,,	Feb. 22	7/5/6	80/-	Maidstone 5 p.c.	..	107—112	...
63,480	,,	June 28	—	3%	Do. 3 p.c. Deb	..	52—57*	...
75,000	5	June 14	6	5/6	Malta & Mediterranean { Met. of Melbourne 4½ p.c. Deb.	4¼—4¾	3¾—4	...
100,000	100	Apl. 5	4½	4½%	Monte Video, Ltd.	99—101	97—100	...
541,920	Stk.	May 17	4	4%	Newcastle & Gatsh'dCon.	11½—12	55—60	55
1,875,892	,,	Feb. 22	4½	5¼%	Do. 4 p.c. Pref. Stk.	98½—99½	87—88	...
250,166	,,	,,	—	4%	Do. 3½ p.c. Deb.	..	76—78	...
529,705	,,	June 28	3½	3½%	North Middlesex 10 p.c.	82—83	70—72*	...
15,000	10	Aug. 26	—	7/6	,, 7 p.c.	..	..	...
55,940	10	Mar. 8	7/14/0	7/8¾	Oriental, Ltd.	14—15	12—13	...
300,000	Stk.	May 3	8	8%	Plym'th & Stonh'se 5 p.c.	117—122	97—102	98
188,120	Stk.	June 28	—	78/9	Portsea Island, B	..	105—110*	...
60,000	50	Mar. 8	13	65/-	Do. C	128—131	103—108	...
100,000	50	,,	12	60/-	Primitiva Ord.	118—121	100—105	...
290,069	5	—	8	—	Do. 5 p.c. Pref.	5⅛—6	⅛—¼	...
499,960	5	—	5	—	Do. 4 p.c. Deb.	4¼—5	1¼—2	35/-
521,600	100	June 1	4	4%	Do. ,, ,, 1911	91—93	73—75	...
600,000	Stk.	Jan. 25	4	4%	River Plate 4 p.c. Deb.	..	57—60	...
346,198	,,	June 28	4	4%	San Paulo { 6 p.c. Pref.	85—87	56—59*	...
150,000	10	Mar. 22	6	6/-	San Paulo { 5 p.c. Deb.	10½—11	5¼—6¼	...
125,000	50	July 2	5	5%	Sheffield A	47—49	37—40*	...
135,000	Stk.	Mar. 22	10	5%	Do. B	223—224	104—106	...
209,984	,,	,,	10	5%	Do. C	222—224	104—106	...
522,500	,,	,,	10	5%	Shrewsbury 5 p.c.	220—222	104—106	...
133,201	Stk.	Sept. 15	4	4%	South African	..	..	...
90,000	10	May 31	9	9/-	South Met. Ord.	10¼—11¼	8—10	...
6,609,895	Stk.	Feb. 22	5/4/0	60/-	Do. Red. Pref.	111—113	98¼—100½	98¼—99½
250,000	,,	Jan. 11	—	5%	Do. 3 p.c. Deb.	..	93—100	...
1,893,443	,,	,,	3	3%	Do. 6¼ p.c. Deb.	72¼—74¼	63—65	...
734,000	,,	Mar. 8	—	6¼%	South Shields Con. Stk.	..	106—108	...
91,500	,,	Feb. 22	8¼	8¼%	S'th Suburb'n Ord. 5 p.c.	157—159	129—131	...
1,087,795	,,	,,	6	6%	Do. 5 p.c. Deb. Stk.	114—116	103—106	...
368,837	,,	June 28	5	5%	S'th'mpt'n Ord. 5 p.c. max.	116—118	93—98*	97—98
647,740	,,	May 3	5	7%	Do. 4 p.c. Deb. Stk.	99—102	88—91	...
121,275	,,	June 28	4	4%	Swansea 7 p.c. Pref. Stk.	..	72—77*	...
250,000	,,	Mar. 8	—	70/-	Do. 6½ p.c. Deb. Stk.	..	103—105	...
200,000	,,	June 28	—	6¼%	Tottenham { A 5 p.c.	..	105—107*	...
120,000	,,	Feb. 22	—	8%	Tottenham { B 3½ p.c.	135—138	123—128	...
782,275	,,	,,	6	6¼%	Tottenham { 4 p.c. Deb.	115—117	102—107	104
181,255	,,	June 14	4	4%	District	87—89	28—82	...
258,251	Stk.	Mar. 22	5	5%	Tynemouth 5 p.c. max.	108½—109	90—92	...
					Wandsworth, Wimbledon, and Epsom—			
30,000	,,	Feb. 22	8½	87/6	Wandsworth A 5 p.c.	151—156	130—135	...
255,636	,,	,,	6½	72/6	Do. B 3½ p.c.	129—134	115—120	...
108,075	,,	,,	—	61/3	Do. C.	—	100—105	...
140,865	,,	,,	—	61/3	New Ordinary	..	100—105	...
352,000	,,	,,	6½	68/9	Wimbledon 5 p.c.	117—122	112—117	113½—114
98,000	,,	,,	6¾	73/9	Epsom 5 p.c.	121—126	115—120	...
88,416	,,	June 28	3	3%	3 p.c Deb. Stk.	66—69	57—60*	...

* Ex. div.

GASHOLDER AND TANK CONSTRUCTION AT THE SUTTON GAS-WORKS.

1,000,000 cubic feet capacity.

By F. SOUTHWELL CRIPPS.

Price 10/6 net.

WALTER KING, Ltd., "Gas Journal" Offices
No. 11, Bolt Court, Fleet Street, E.C. 4.

Demy 4to. Limp Cloth. Price 10s. 6d.

THE FLOW OF GASES and PROPORTIONING GAS MAINS.

By

F. SOUTHWELL CRIPPS, Assoc.M.Inst.C.E.

WALTER KING, Ltd., "Gas Journal" Offices,
No. 11, Bolt Court, Fleet Street, E.C.4.

Burnley Gas Department.

Mr. J. P. Leather, the Gas Engineer of the Burnley Corporation, in his report for the year ended March 31 last states that the make of gas during the year was 825,207,000 c.ft., being a decrease of 0·50 p.ct. on the previous year. The quantity of sulphate of ammonia produced during the year was 417 tons, which, allowing for the stocks of liquor at the beginning and end of the year, is equal to 21·22 lbs. per ton of coal, as compared with 20·04 lbs. last year. The net receipts per ton of sulphate produced averaged £8 13s., after paying for acid, wages, and carriage. The average for the previous year was £5 1s. The quantity of tar distilled during the year was 2475 tons. The number of meters in use at the present time is 29,663, of which 15,884 are prepayment meters—an increase of 247 of the latter, and a decrease of 169 in the number of other meters. The amount collected from prepayment meters has been £68,256, corresponding to 294,791,613 c.ft. of gas. The total income was £199,980; and £18,978 has been placed to the reserve fund.

Reductions at Richmond (Yorks.).—The Richmond (Yorks.) Town Council have reduced the price of gas to 1s. per therm, with discount of 10 p.ct. for lighting and 15 p.ct. discount for heating and power, by ordinary meter. This is equivalent to 4s. 6d. per 1000 c.ft.—a reduction of 6d. The Mayor (who is Chairman of the Gas Committee) said they hoped to contribute £500 to the relief of the rates.

Leicester Gas Department.—The staff and workmen of the Leicester City gas mains and services department had their annual holiday on Saturday, June 23. The men and their wives were motored to Stratford-on-Avon, *vid* Coventry, Kenilworth, and Warwick. Short stays were made at each of these towns, and places of historic interest were visited. The destination was reached at noon. About seventy sat down to lunch, after which visits were made to the places associated with Shakespeare. A steamboat trip was thoroughly enjoyed. At five o'clock the party reassembled for tea, and were joined by Mr. Hubert Pooley, Engineer and Manager, and Mrs. Pooley. After tea, Mr. Ralph, the Chief of the Department, made some interesting remarks, which were followed by an encouraging speech from Mr. Pooley. Mr. Willet Ball, the organizer of the outing, was heartily thanked for the able way the arrangements had been carried out.

Hume Pipe and Concrete Construction.

The second ordinary general meeting of the Hume Pipe and Concrete Construction Company, Ltd., was held on Wednesday, June 27. Major-General Sir Arthur Wigram Money, K.C.B., the Chairman, in moving the adoption of the report and accounts, said that a proposal to confer on the subscribed stock a 7 p.ct. preference had been discussed by a number of large shareholders of both classes; and the Board unanimously recommended its adoption. They were more than ever convinced that the Hume pipe was the finest concrete pipe now made, both from engineering and economic points of view. As to the work done in England, the large plant installed by the Stanton Ironworks, Ltd. (licensees in Great Britain), was now completed, and was producing several hundred tons of Hume pipes per week; and the investment by this important Corporation of a very large sum in up-to-date plant expressed their confidence in the future. The chances of extensive development on the Continent were enormous; and the work awaiting the Hume process in America was beyond computation. In Saskatchewan, for example, there was one project of over five million sterling in pipe-lines to supply a number of the towns, and all of this most suitable for Hume pipe.

Combination Column and Spiral-Guided Holder.—A gasholder is being erected for the Folkestone Gas Company by Messrs. Firth Blakeley, Sons, & Co., Ltd., which is in three lifts, and shows some novel features, being a combination of the column and spiral-guided type. The middle and outer lifts are to be column guided and the inner lift spiral guided.

Stockton and the Yarm Gas-Works.—The Stockton-on-Tees Corporation have decided to purchase the works owned by the Yarm-on-Tees Gas Company, at a cost of £3000, and to dismantle them and supply the consumers from the Stockton works. The price proposed to be charged by Stockton was not mentioned. It is stated, however, that the Yarm Company have been charging 6s. 8d. per 1000 c.ft. The highest charge made by Stockton for supplying places outside the borough is 4s. 6d. per 1000 c.ft., in the case of Wolviston.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer—not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON TUESDAY, to ensure insertion in the following day's issue.

Orders to Alter or Stop PERMANENT ADVERTISEMENTS should be received by the FIRST POST on Monday.

UNDISPLAYED ADVERTISEMENTS; Situations Wanted, Six Lines and under (about 36 words) 3s.; each additional Line, 6d. Situations Vacant, Apparatus Wanted and for Sale, Contracts, Public Notices, &c., 9d. per Line—minimum, 4s. 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."

		ONE YEAR.	HALF-YEAR.	QUARTER.
United Kingdom	Advance Rate:	35/-	18/-	10/-
	Credit Rate:	40/-	21/-	11/6
Abroad (in the Posta Union) Payable in Advance		40/-	22/6	12/6

In payment of subscriptions for "JOURNALS" sent abroad, Post Office Orders or Bankers' Drafts on London only are accepted.

All Communications, Remittances, &c., to be addressed to WALTER KING, LIMITED, 11, BOLT COURT, FLEET STREET, LONDON, E.C. 4.

Telegrams: "GASKING, FLEET LONDON." Telephone: Holborn 6857.

OXIDE OF IRON

FOR SALE OUTRIGHT, OR ON LOAN.

SPENT OXIDE

PURCHASED IN ANY DISTRICT.

GAS PURIFICATION & CHEMICAL CO., LTD.,
PALMERSTON HOUSE,
OLD BROAD STREET, LONDON, E.C.2.

"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for Gas-Works.
ANDREW STEPHENSON, Gresham House, Old Broad Street, LONDON, E.C. "Volcanism, London."

SULPHATE OF AMMONIA
SATURATORS and all LEAD and TIMBER WORK in connection with Sulphate Plants.
We Guarantee promptness with efficiency for Repairs.
JOSEPH TAYLOR (SATURATORS), LTD., Chemical Plant Engineers, Blackhorse Street Mills, BOLTON.
Telegrams—"SATURATORS, BOLTON." Telephone 848.

SULPHURIC ACID.

SPECIALLY prepared for the manufacture of SULPHATE OF AMMONIA.
SPENCER CHAPMAN & MESSEL, LTD.,
with which is amalgamated WM. PEARCE & SONS, LTD.
36, Mark Lane, LONDON, E.C. Works—SILVERTOWN.
Telegrams—"HYDROCHLORIC, FEN, LONDON."
Telephone—MINORIES 1166.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, LONDON, S.E. 1.
WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS AND GOVERNORS.
REPAIRS RECEIVE PROMPT ATTENTION.
Telephones: 815 Oldham, and 2412 Hop, London.
Telegrams—"BRADDOCK, OLDHAM," and "METRIQUE, LAMB, LONDON."

WE Specialize in Small Gas-Works and Solicit Inquiries for COMPLETE WORKS, EXTENSIONS, and RENEWALS.
Penney & Porter (Engineers), Ltd.,
LINCOLN.
Established 1855.
Telegrams: Porter, Lincoln. Telephones: 266 & 211.

WANTED.

TAR, Light Oils, Crude Benzole and NAPHTHAS,
For which we are prepared to pay Good Prices.
FREDK. G. HOLMES & CO., LTD.,
THAMES TAR WORKS, NORTHFLEET, KENT.

GEORGE WILSON GAS METERS, Ltd.
for
GAS-METERS, ORDINARIES, SLOTS, AND REPAIRS,
Foleshill Road, COVENTRY.
Telephone: 596. Telegrams: "GASMETER,"
and at 238, Stockport Road, MANCHESTER.
Telephone: RUSHOLME 976. Telegrams: "GASMETER,"
and 46 & 47, Auckland Street, LONDON, S.E. 11.
Telephone: HOP 647. Telegrams: "GASEOUS LAMB."

OXIDE OF IRON.
SPENT OXIDE BOUGHT.

BALE & CHURCH, LTD.
33, ST. MARY AT HILL, LONDON, E.C.3.
Phone: MINORIES 1484.

"TORTO" FIRE CEMENT.

BALE & CHURCH, LTD.
33, ST. MARY AT HILL, LONDON, E.C.3.
Phone: MINORIES 1484.

"KLEENOFF," THE COOKER CLEANSER.
Tins for Sale to Consumers.
In Bulk for Works Use.

BALE & CHURCH, LTD.,
33, ST. MARY AT HILL, LONDON, E.C.3.
Phone: MINORIES 1484.

SPENCER'S Patent Inclined HURDLE GRIDS.

THE very best Patent Grids for Holding Oxide Lightly.
See Illustrated Advertisement, June 23, p. 762.

BRITISH GAS PURIFYING MATERIAL.

ENGLISH BOG ORE AND NATURAL HYDRATED OXIDE OF IRON.
SPENT OXIDE BOUGHT.

BRITISH GAS PURIFYING MATERIALS CO., LTD.,
ARCADIAN GARDENS, WOOD GREEN, LONDON, N.22.
Telegrams: "Bripurimat, Wood, London."
'Phone: Palmers Green 608

INDEX TO "JOURNAL" ADVERTISERS.

	PAGE
Ackroyd & Best, Ltd.	229
Alder & Mackay, Ltd.	—
Aldridge & Ranken, Ltd.	—
Allan, Thomas, & Sons, Ltd.	278
Amalgamated Dinas Silica Works, Ltd.	—
Anglo-American Oil Company, Ltd.	—
Anglo-Swedish Electric Welding Co., Ltd.	Centre VI.
Ashmore, Benson, Pease, & Co., Ltd.	—
Automatic Light Controlling Co., Ltd.	—
Bagshawe, and Co., Ltd.	—
Bale & Church, Ltd.	275
Balfour, Henry, & Co., Ltd.	—
Barrowfield Ironworks, Ltd.	227
Bates, J., & Sons	277
Bellias & Morcom, Ltd.	—
Benn Bros., Ltd.	—
Berk, F. W., & Co., Ltd.	Wrapper I
Blair, Campbell, & M'Lean, Ltd.	235
Blakeley (Firth) Sons, & Co., Ltd.	278
Bland Light Syndicate, Ltd.	—
Bourne, C.	—
Braddock, J. & J.	275
British Aluminium Co., Ltd.	—
British Arca Regulators, Ltd.	—
British Creosote Company, Ltd.	232
British Furnaces, Ltd.	—
British Gas Purifying Materials Company, Ltd.	275
British Mannesmann Tube Co., Ltd.	—
British Thomson-Houston Co., Ltd.	—
British Uralite and Cellactite Works	229
Brotherton & Co., Ltd.	277
Brown, John, & Co., Ltd.	229
Brownhills Chemical Works Co.	—
Bugden, T., & Co.	—
Burt, Boulton, & Haywood, Ltd.	—
Cannon Iron Foundries, Ltd.	241
"Captive Fire"	—
Carless, Capel, & Leonard	—
Carron Company	—
Chance Bros. & Co., Ltd.	—
Chapman (Spencer) & Messel, Ltd.	275
Chemical Engineering and Wilton's Patent Furnace Company, Ltd.	—
Clark's Syphon Stove Co., Ltd.	—
Clapham Bros., Ltd.	—
Clayton, Son, & Co., Ltd.	285
Clayton, Thomas (Oldbury), Ltd.	—
Cloake, A. G.	—
Cockey, E., & Sons, Ltd.	238
Coin Change Company, Ltd.	—
Cort, Robt., & Co.	239
Cossey, E. J., & Co.	—
Cowan, W. & B.	Wrapper III.
Crossley Bros.	—
Cutler (Samuel) & Sons, Ltd	Centre V.
Davies, Wm. Everard, & Co., Ltd.	—
Davison & Partner, Ltd.	283
Dempster, R. & J., Ltd.	272
Dempster, R., and Sons, Ltd.	Centre IV., 278, 283
Dixon, Joseph, Crucible Company	—
Donkin Company, Ltd. (The Bryan),	Wrapper II.
Dorman, W. H., & Co., Ltd.	—
Drakes Limited	—
Drew-Bear, Perks & Co., Ltd.	—
Duxbury, Thomas, & Co.	278
Economical Gas Apparatus Construction Company, Ltd.	Centre VI.
Engineering Supplies, Ltd.	—
Evans, Joseph, & Son (Wolverhampton), Ltd.	283
Ewart & Son, Ltd.	—
F. C. Construction Co., Ltd.	238
Falk, Stadelmann, & Co., Ltd.	285
Fell, Anderson & Co., Ltd.	—
Foamite Firefoam, Ltd.	—
Fraser and Chalmers Engineering Works	Centre V.
Gas Lighting Improvement Co., Ltd.	278
Gas Meter Company, Ltd.	Wrapper IV., 235
Gas Purification and Chemical Company, Ltd.	Wrapper I., 275
Gibbons Bros., Ltd.	284
Glenboig Union Fire Clay Company, Ltd.	279
Glover (George) and Co., Ltd.	Wrapper I.
Glover, Thos., & Co., Ltd.	242
Goodall, Clayton, & Co., Ltd.	Wrapper IV.
Grainger, J. E.	—
Grant, David, & Co.	282
Grantham Boiler and Crank Company, Ltd.	277
Green and Boulding, Ltd.	278
Griffin, John J., & Son, Ltd.	—
Griffiths Bros. & Co. (London), Ltd.	Wrapper I.
Hall, John, & Co., Stourbridge, Ltd.	278
Hardman and Holden, Ltd.	228
Harris and Pearson	282
Hawley, J., & Sons	—
Hawthorn Leslie & Co.	—
Head, Wrightson, & Co., Ltd.	Wrapper I.
Hislop, R. & G.	282
Holborn Lamp and Sign Works	279
Holmes, F. G., & Co., Ltd.	275
Holmes, W. C., & Co., Ltd.	228
Hooper and Weyman, Ltd.	278
Horseley Bridge and Engineering Company, Ltd.	Wrapper II.
Horstmann Gear Company, Ltd.	237
Humphreys and Glasgow, Ltd.	240
Hutchinson Bros., Ltd.	—
Hydronyl Syndicate, Ltd.	—
Industrial Constructions, Ltd.	—
Jenkins, W. J., & Co., Ltd.	—
Jobson and Beckwith, Ltd.	—
Keighley Gas and Oil Engine Company, Ltd.	—
Keith, James, and Blackman Company, Ltd.	286
Kent, Geo., Ltd.	231
Kenyon, Alexander, & Co., Ltd.	279
Kieselguhr Supplies Co.	—
King, Taudevin, and Gregson, Ltd.	—
King's Patent Agency	277
Kirkham, Hulett, and Chandler, Ltd.	—
Laidlaw, R., & Son (Edin.), Ltd.	284
Laidlaw, R., & Son, Ltd.	—
Le Grand, Sutcliff, and Gell	—
Lead Wool Company, Ltd.	—
Lord, J. E. C. (Manchester), Ltd.	277
Low Temperature Construction, Ltd.	—
Macpherson, D., & Co., Ltd.	—
Main, R. & A., Ltd.	234
McKelvie, James, & Co.	Wrapper I.
Meldrums Limited	—
Messenger & Sons	—
Metropolitan Gas Meters, Ltd.	—
Mewburn, Ellis, & Co.	277
Midland Railway Carriage and Wagon Co., Ltd.	Wrapper IV.
Mitchell, H.	—
Mobberley and Perry, Ltd.	—
Model Engineering Company, Ltd.	—
Moore, Walter, & Sons	Wrapper I.
Neill & Son, Ltd.	Wrapper I.
New Conveyor Co., Ltd.	—
Newton, Chambers, & Co., Ltd.	282
Orme, George, & Co.	—
Oughtibridge Silica Firebrick Company, Ltd.	239
Page, Chas., & Co., Ltd.	—
Parkinson and W. & B. Cowan, Ltd.	280
Parkinson Stove Company, Ltd.	236
Parkinson, W., & Co.	242
Peckett & Sons, Ltd.	279
Peebles & Co., Ltd.	—
Penney and Porter, Ltd.	275
Penningtons Engineering Tutors	277
Perch, William, Ltd.	279
Pifco, Ltd.	—
Piggott, Thos., & Co., Ltd.	226
Pinchbeck, Ltd.	—
Pocock, Herbert	—
Podmore, A. E., & Co.	—
Potterton, Thos.	—
Procter, E. W.	228
Pulsometer Engineering Company, Ltd.	Wrapper IV.
Radiation, Ltd.	Centre II., III.
Ratcliffe and Sons (Hawarden), Ltd.	—
Reavell & Co., Ltd.	238
Richmond Gas Stove & Meter Co., Ltd.	—
Ride and Bell, Ltd.	—
Riley, John, & Sons, Ltd.	—
Robson, Geo., & Co.	279
Rotary Meter Company, Ltd.	238
Ruston & Hornsby, Ltd.	—
Sawer & Purves	273
Serck Tubes, Ltd.	237
Shields & Ramsay	232
Sigma Instrument Company	—
Simon-Carves, Ltd.	225
Simplex Concrete Piles, Ltd.	—
Smith, J. & W. B., Ltd.	—
Smith Meters, Ltd.	—
South Metropolitan Gas Company	280
Spencer-Bonecourt, Ltd.	—
Spencer Chapman, & Messel, Ltd.	275
Spencer, Walter, & Sons	275
Stanforth, H.	—
Stanton Ironworks Co., Ltd.	—
Staveley Coal & Iron Co., Ltd.	—
Stein, J. G., & Co., Ltd.	Wrapper I.
Stephenson, Andrew	275
Stewarts & Lloyds, Ltd.	Wrapper I.
Stothert & Pitt, Ltd.	—
Strachan & Henshaw, Ltd.	—
Stringer Bros.	—
Sugden, T., Ltd.	—
Sugg, Wm., & Co., Ltd.	—
Sutherland Meter Company, Ltd.	—
Taylor, Joseph, & Co. (Saturators), Ltd.	275
Telephos, Ltd.	—
Thermal Syndicate, Ltd.	281
Thompson, John (Wolverhampton) Ltd.	278
Thrutchley & Co., Ltd.	Centre V.
Tilley High Pressure Gas Syndicate, Ltd.	—
Torbay Paint Company	Wrapper I.
Trier Bros., Ltd.	—
Trotter, Haines, and Corbett, Ltd.	279
Tully Gas Plants, Ltd.	233, 277
Turbine Furnace Co., Ltd.	—
Turner, F.	—
Underfeed Stoker Co., Ltd.	—
Vale, Thos., & Son, Ltd.	—
Vee-Reg Valves—Engineering Specialists, Ltd.	279
Vertical Gas Retort Synd., Ltd.	281
Vickers, Ltd.	231
Vislok, Ltd.	—
Walker, C. & W., Ltd.	Centre VI.
Walker, Crosweller, & Co.	238
Waller, Geo., & Son, Ltd.	226
Waugh, Walter, & Co.	282
Welsbach Light Company, Ltd.	236
West's Gas Improvement Co., Ltd.	230
Westwood and Wrights	—
Whessoe Foundry and Engineering Company, Ltd.	—
Wholesale Fittings Company, Ltd.	—
Williamson, Cliff, Ltd.	—
Willey & Co., Ltd.	—
Wilson, Carter, and Pearson	—
Wilson (George) Gas Meters, Ltd.	275
Wilsons & Mathiesons, Ltd.	—
Wood, Hugh, & Co.	280
Woodall-Duckham Company	Centre I.
W.R. Patents, Ltd.	237
Wright, Alex., and Co., Ltd.	271
Wright, John, & Co.	—
Appointments Vacant and Wanted	277
Company Notices	—
Contracts Open	277
Plant Wanted and for Sale	277